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RESEARCH IN PROGRESS

JULY, 1921—JULY, 1922

The following pages contain a record of such activities of the Graduate Faculty and of advanced students as are related to the advancement of learning. Publications of a general or popular nature, public addresses of the faculty, and the project work, or elementary research conducted in undergraduate classes, are not included. Abstracts of dissertations of candidates for higher degrees are included, even when these dissertations have not yet been published, because such work comes within the field covered by this bulletin. In the appendix will be found an abstract of the work of the Graduate Club. This organization differs from the other research organizations at the University in that its purpose is to bring about closer relations among the various departments and to show the interdependence of the fields of learning.

Special committees of the Graduate Faculty are coöperating with the Administrative Board in the study of certain problems connected with research at the University. The place of elementary research in undergraduate classes, the discovery and encouragement of men capable of independent investigation, the proper fields of the higher degrees, the relation between research and teaching, and the special provinces in investigation in which this University may do most effective work, are among the problems now being considered by these committees.

During the year, the Special Research Fund of $1000, referred to in the last issue of this Bulletin, was appropriated in aid of thirteen projects on which members of the graduate faculty have been working. In pursuance of the policy announced by the Administrative Board at the time when the special fund was created, the money was appropriated in relatively small

amounts in order to assist as many workers as possible, instead of being concentrated. Such of these investigations as have been completed are described in the following pages; a brief tabulation is appended for purposes of record and reference:

PROJECT NUMBER	PROFESSOR	SUBJECT	AMOUNT
1	Dashiell	Maze Problem	$ 100.00
2	Hickerson	Transition Curves	100.00
3	Knight	Southern educational documents	60.00
4	George	Laboratory material in histology and embryology	75.00
5	Henderson	Transcription of documents in European Libraries	100.00
6	Harrer	Transcription of documents in European Libraries	40.00
7	Saville	Laboratory material for research in sanitary engineering	112.00
8	Wheeler	Materials for study of action of phenylsemicarbazine in diketones	50.00
9	Odum	Special tabulation work	22.00
10	MacNider	Materials for research in pathology of the kidney	162.50
11	Murchison	Materials for state economic survey	75.00
12	Coker	Field work investigation	75.00
13	Crane	Laboratory material for group intelligence test	48.50

The University of North Carolina Press has been incorporated and has already organized for work. It will be a function of the Press to aid in the publication of the results of research carried on at the University. Besides taking over the research journals now published by the University, it will publish monographs embodying the results of original investigations by members of the University staff. Two books of this nature are to appear shortly, the contribution of the Department of Botany.

EDWIN GREENLAW, *Dean.*

DEPARTMENT OF ANATOMY

W. C. George. *A Note on the Pulmonary Circulation in Vertebrates.* A paper presented before the N. C. Academy of Science, May, 1922, Chapel Hill, N. C.

In this paper a study is made of various types of vascular pulmonary anomalies that occur in man and the higher vertebrates and they are classified from the standpoint of their embryonic origin and their probable homologies with the blood vessels supplying the air-bladders of fishes.

DEPARTMENT OF BOTANY

W. C. Coker has published the following articles in the *Journal of the Elisha Mitchell Scientific Society* during the past year:

The Collybias of North Carolina. (With H. C. Beardslee.)

Plates 4-23; Vol. 37, pp. 83-107, December, 1921. Plate 3 is in color; plates 3-23 are from photographs, and plate 23 shows microscopic detail. One new species is described. The paper includes all species (22) of the genus that have been found in Chapel Hill or Asheville and studied in the living condition.

A New Genus of Water Mold Related to Blastocladia. (With F. A. Grant.) Vol. 37, pp. 180-182, Pl. 32, March, 1922.

This remarkable water mold, which is now known to be the same as *Allomyces arbuscula,* heretofore has been found only in India, the Philippines, Louisiana and Chapel Hill. It was found here on a piece of beef bone in shallow water.

A monograph on *The Saprolegniaceae of the United States,* which has been with the printers for over a year, has now been put in page proof and is expected to appear during the fall. It will contain descriptions of all known species and direct observations on nearly all American species. There will be 63 plates, mostly of microscopic detail. The book will be published by the University of North Carolina Press.

The Clavarias of the United States and Canada is now in press. It includes all known species in the area covered, most of which have been redescribed from the living condition. There will be 7 plates in color, 71 half-tones of photographs and 9 zinc plates of microscopic detail. This book will also be published by the University of North Carolina Press.

Two volumes on *The Mushrooms of North Carolina* for the North Carolina Geological and Economic Survey are in progress and it is expected that the first of these will be ready for the printer within the next few months.

The next chapter of the North Carolina Agarics will appear in the next number of the *Mitchell Journal,* Vol. 38, Nos. 1 & 2. It will treat the *Clitocybes* of the state, with the coöperation of H. C. Beardslee.

H. R. TOTTEN is continuing his studies on the sexuality of the fungi. Single spore cultures of several of the higher *Basidiomycetes* are being investigated. In the *Saprolegniaceae* the formation of the egg and its fertilization in *Achlya stelligera* and *Achlya Klebsiana* are under investigation. Mr. Totten is also carrying on systematic investigations on the genus *Coprinus.*

J. N. COUCH. Spore Formation and Discharge in some Genera of Water Molds. (Thesis for the A.M. degree.)

The spore origins in *Leptolegnia* first appear as enlarged masses or thickenings in the sporangial membrane, lining the waïl, the usual arrangement of the masses being alternate with one another on opposite sides of the sporangium. This condition is analogous to the "first cleavage stage" in *Achlya* and *Saprolegnia.* The spore masses in this position are connected by the parietal lining membrane thickened between the ends of the spore origins on the same side and fine strands of protoplasm. This parietal protoplasm moves toward the center of the thread, the spore origins losing their identity. This stage is analogous to the "homogeneous" stage of Busgen or the "stage of swelling of the spores" of Rothert. As development proceeds all of these strands except the ones originally connecting each line of spore masses on either side of the sporangium and continuous laterally with the sporangial membrane are absorbed by the forming

spores along with the sporangial membrane. These thickenings in the sporangial membrane normally persist between the spore origins and become thinned down into very delicate threads; thus each spore comes to have four connections, two before and two behind.

The spores usually emerge now as rods with the connections on the ends, in which case, upon emergence, the connections are broken, two usually being left on one end of each spore (Petersen '10). The rod now bends forming a V, the ends of the rod approaching each other until they finally fuse (Coker '09; Petersen '10). As this bending proceeds, the two threads move to the normal position of cilia. Occasionally the connections may lash so vigorously before the spores emerge as to break, in which case the connections may move around to occupy the future apical end of the spore (Coker '09). Thus the cilia in Leptolegnia are formed from threads originally connecting the spore origins.

During the formation of the spores, cell sap is given off as is evidenced by their contraction. This cell sap in stimulating osmosis plays an important part in the discharge of the spores.

The spore origins and spores are uninucleate; the nuclei arising by indirect division in the growing threads, the supernumerary ones degenerating.

Under certain conditions the spores of certain species of *Achlya* show slight movement within the sporangium.

During emergence the spores of *Achlya* are held together by delicate threads which by their contraction arrange the spores in a hollow ball. Hartog's theory of adelphotaxy is, therefore, unnecessary, as is also Rothert's theory of a ball of jelly, in which the discharging spores lodge. Careful tests with numerous reägents by H. R. Totten and by the author have failed to show any such jelly.

Killed on emerging, the threads were in some cases seen to be on opposite ends of the spores. In other cases they were found to be in the normal position for cilia. All intermediate stages between these two positions occur. The cilia in *Achlya*, in the species investigated, are also formed from the connecting threads.

An *Aphanomyces* the spores are held together during and after emergence by delicate protoplasmic threads.

DEPARTMENT OF CHEMISTRY

JAMES M. BELL AND JOSEPH L. MCEWEN. Studies on the Nitrotoluenes. VIII. Binary Systems of m-Nitrotoluene with another Mononitrotoluene. *Jour. Ind. Eng. Chem.,* 14, 536-8 (1922).

In the binary system, m-nitrotoluene—p-nitrotoluene there are two freezing point curves with a eutectic temperature at -2.8° and a eutectic composition of 37% of p-nitrotoluene. In the binary system, m-nitrotoluene—o-nitrotoluene, the eutectic temperature is -31.65° and the eutectic composition is 48% m-nitrotoluene. There are two curves on the o-nitrotoluene side corresponding to the stable and metastable forms of the latter compound.

FRANCIS P. VENABLE. Zirconium and its Compounds. American Chemical Society. Monograph Series. Published by the Chemical Catalog Company, Inc., New York. 173 pp. (March, 1922).

This monograph forms one of the first of a series published under the auspices of the American Chemical Society. This society has undertaken these publications in order to present the knowledge available upon the chosen subject in a readable form, intelligible to those whose activities may be along a wholly different line, and also in order to promote further research by furnishing a well-digested survey of the progress already made in that field and by pointing out directions in which investigation needs to be extended. This monograph on the element zirconium and its compounds summarizes the results of over 800 articles and many patent specifications. The chapter headings are: I. History and Occurrence; II. Zirconium and its Properties; III. Compound of Zirconium with the Elements; IV. Compounds of Zirconium with the Halogens and Their Acids. V. Compounds of Zirconium with the Acids of Sulfur and Selenium; VI. Compounds of Zirconium with Acids of the Nitrogen Group and Rare Inorganic Acids; VII. Compounds with Acids of the Silicon Group; VIII. Zirconic Acid and the Zirconates; IX. Compounds with Organic Acids and Radicals; X. Analytical Methods; XI. Technical Applications of Zirconium and Its Compounds; XII. Patents.

Isotopes. *Jour. Elisha Mitchell Scientific Society,* 37, 115-122 (1922).

The fundamental concept in chemistry is that of the atom. The atomic theory is the basis of all explanations offered as to the con-

stitution of matter and such reäctions and other changes as may occur in matter. The mass or weight of an atom has been assumed to be an unvarying property and hence to be classed as a constant of nature. The study of radioactivity has solved the constitution of the atom and it is now known to be a positive nucleus of alpha particles surrounded by a field of negative electrons. The chemical properties of the atom are determined by the number of electrons, and it has been found that nuclei of different masses may be surrounded by the same number of electrons. Such atoms have different weights but identical chemical properties and they are called isotopes. Many elements are isotopic. Thus neon (atomic weight 20.2) has been shown to have atoms of weights: 20, 21 and 22. All individual atoms have weights which are whole numbers and consequently elements whose atomic weights are not whole numbers must be made up of two or more isotopes, the apparent atomic weight being the average of the weights of all the atoms. With the masses of all atoms multiples of unity it seems probable that the atoms themselves are all composed of chemically similar particles. Atomic disintegration also seems to point in that direction.

Alvin S. Wheeler and T. M. Andrews. (Ph.D. Thesis, 1921.)

Hydroxynaphthoquinone Studies IV. New Derivatives of 2, 3, 8-Tribromo-5-hydroxy-1, 4-naphthoquinone. *Jour. Amer. Chem. Soc.*, 43, 2582 (Dec. 1921).

Abstract given in Research in Progress for 1921, page 8.

Alvin S. Wheeler and I. W. Smithey. (Ph.D. Thesis, 1921.)

Para-Cymene Studies III. The Bromination of 2-Amino-p-cymene. *Jour. Amer. Chem. Soc.*, 43, 5611 (Dec. 1921).

Abstract given in Research in Progress for 1921, page 9.

Alvin S. Wheeler and I. V. Giles. (Ph.D. Thesis, 1922.)

Para-cymene Studies IV.

The Chlorination of 2-Amino-p-cymene.

Para cymene, obtained from spruce turpentine, was nitrated and reduced to 2-amino-p-cymene. The acetyl derivative of this compound was made to protect the amino group in chlorination. Chlorination in cold carbontetrachloride gave a mono-chloro derivative,—the chlorine atom entering the ring at position 5 (para to the acetyl-amino group).

This body crystallized from alcohol in white glistening needles which melted at 109-111°. Calc. for $C_{12}H_{16}ONCl$., Cl, 15.72%. Found 15.36, 15.60%. The acetyl derivative was hydrolysed to the hydrochloride by boiling with concentrated hydrochloric acid. It crystallized from dilute hydrochloric acid in white pearly plates which melted at 228°, with decomposition. Calc. for $C_{10}H_{14}NCl$. HCl., Cl, 16.12% (as hydrochloride). Found: 16.34, 16.55%. The hydrochloride which was easily obtained in the pure state was used as the raw material for most of the investigations. The substance which was in reality the nucleus or starting point in the research was the free amine which was obtained by treatment of the hydrochloride with an alkali and steam distilling. A light red liquid heavier than water and slightly soluble in water was obtained. It distilled at 240-250°. The simple derivatives made of this amine were sulphate, consisting of white plates which melted at 139°, and chloroplatinate which crystallized from alcohol in yellow crystals which melted at 170° with decomposition. The benzoyl derivative was made by treating the amine with benzoyl chloride. It crystallized from alcohol in clear white prismatic needles which melted at 137.5°. Calc. for $C_{17}H_{18}ONCl$., Cl, 12.35%. Found: 12.22, 12.36%.

The hydrochloride of the amine was diazotised and a number of derivatives were made. *Diazo-5-chloro-2-amino-p-cymene* was made by treating one mole, of the diazotised chloro-amino-cymene with one mole, of the hydrochloride of the same compound. It crystallized from gasoline in long yellow needles which melted at 135-137°. Calc. for $C_{20}H_{25}N_3Cl_2$., Cl, 18.78%. Found: 19.06%. *5-chloro-2-hydroxy-p-cymene* (*chloro-carvacrol*) was obtained by heating the diazotized solution of the amine on a water bath. It was an oily substance which distilled at 158° at 52mm. pressure. Calc. for $C_{10}H_{13}OCl$., Cl, 19.24%. Found: 19.06%.

The diazo compound was linked with a number of compounds containing the OH group. The reactions were carried out by treating the hydroxy compound, dissolved in an excess of sodium hydroxide, with an equivalent solution of the diazotised amine. These substances thus obtained are analogous to the class of substances known as hydroxyazo dyes. With beta-naphthol *1-(5-chlorocarvacrylazo)-2-naphthol* was obtained which crystallized from alcohol in hexagonal plates which melted at 163°. It dyed wool and silk a scarlet color. Alpha-naphthol yielded *4-(5-chlorocarvacrylazo)-1-naphthol* which crystallized from gasoline in brown needles which melted at 128°. It dyed wool a claret brown. Resorcinol gave *4-(5-chlorocarvacrylazo)-resorcinol* which melted at 188°. It dyed wool a Brazil red and silk a Morocco red. With phenol *2-4(5-chlorocarvacrylazo)-phenol*, a disazo dye was obtained. It crystallized from acetic acid in bronze needles which melted at 196°. It dyed wool a Capucine yellow and silk a cadmium yellow. With salicylic

acid *4-(5-chlorocarvacrylazo)-salicylic acid* was obtained which melted at 165°. It dyed wool a Mars orange color. All these above named substances are "developed" dyes. With different naphthol sulfonic acids three direct dyes were obtained. *4-(5-chlorocarvacrylazo)-1-naphthol-2-sulfonic acid* was obtained from 1-naphthol-2-sulfonic acid. It dyed wool a burnt sienna color and silk an English red. *1-(5-chlorocarvacrylazo)-2-naphthol-7-sulfonic acid* was obtained from 2-naphthol-7-sulfonic acid. It dyed wool a scarlet red and silk a scarlet. *2-(5-chlorocarvacrylazo)-1-naphthol-4-sulfonic acid* was obtained from 1-naphthol-4-sulfonic acid. It dyed both wool and silk a scarlet. All these dyes are fast colors to water and sunlight, and on all these compounds satisfactory analyses were made to verify their constitution.

The amine was treated by Sandmeyer's reaction with cuprous cyanide to obtain the nitrile which was hydrolysed to the acid,—*5-chloro-2-carboxylic acid-p-cymene.* It crystallized from alcohol in white needles which melted at 125°. Calc. for $C_{11}HO_2Cl$., Cl, 16.71%. Found 17.00%.

Orientation. A very important phase of the investigation was the orientation of the chlorine atom. Theoretically, the chlorine atom may occupy either of seven positions,—four being in the side chains and three in the nucleus at positions 3, 5, and 6. The first four were eliminated because of the conditions of chlorination and properties of the compound formed. The problem was to determine which of the three positions in the ring the chlorine atom occupied. After a number of unsuccessful attacks the amino group was substituted with another chlorine atom by Sandmeyer's reaction. This gave a dichloro-cymene, which when oxidized with nitric acid, sp. gr. 1.15, in a sealed tube at 180° for 10 hours yielded 2-5 dichloroterephthalic acid which is a known compound and melts at 305°. As further evidence that the oxidation product was 2-5-dichloroterephthalic acid, it yielded the dimethyl ester which is also known and melts at 136°. Since the replacement of the amino group with chlorine gave a dichloro compound in which the chlorine atoms were para to each other, the chlorine atom first introduced must have entered para to the acetylamino group or position 5 in the cymene ring.

ALVIN S. WHEELER AND H. M. TAYLOR (Progress on Ph.D. Thesis).

Para-Cymene Studies V. The Constitution of 2-Amino-Monobromo-p-cymene.

Material has been prepared for this research. The steps involved were as follows: spruce turpentine → p-cymene → 2-nitro-p-cymene → 2-amino-p-cymene → 2-acetylamino-p-cymene → 2-acetylaminomonobromo-p-cymene → 2-amino-monobromo-p-cymene hydrobromide.

ALVIN S. WHEELER AND S. C. SMITH (Progress on Ph.D. Thesis). The Orientation of the Hydroxyl Group in Certain Derivatives of Schiff's Bases.

p-Nitoaniline (2 moles) was condensed with chloral (1 mole) by Wheeler and Weller in 1902. The condensation product was treated by Wheeler and Glenn with potassium hydroxide in 1903. The location of the hydroxyl group which displaced one chlorine atom of the three present has never been determined with certainty. Our recent decomposition of the hydroxyl derivative with sulfuric acid has led to a study of the action of dichloroacetic acid upon aromatic amines, a field which has been little explored. A series of well defined compounds have been prepared but the analytical results do not yet lead us to any satisfactory theory as to their nature.

A. S. WHEELER AND F. P. BROOKS. Master's Thesis (1922). A study of the action of acetonyl acetone on phenylsemi-carbazine.

This is a part of the studies completed and in progress in the Department of Chemistry on the action of diketones and simple ketones with the complex azine, phenylsemicarbazine. These studies are based upon those of Curtius and Hoffmann, *J. für practische Chemie*, 53, p. 530.; Rosengarten (*Annalen der Chemie*), 79, p. 237, and Knorr (*Berichte* XX, p. 1104). The above mentioned men worked with either simple ketones or the simpler forms of the azines while in our work the action of ketones on the more complex phenylsemicarbazine was to be studied.

The first paper of this series was the study of Wheeler and Pickett on the action of acetone on phenylsemicarbazine. This was the Master's Thesis of Pickett. At present the study of the action of acetyl acetone is being carried out by Dr. Wheeler.

In taking up this study it was necessary first to prepare the phenylsemicarbazine as it could not be obtained on the market. This was done by the use of potassium cyanate through the intermediate monophenyl urea prepared according to the method of W. Weith

(*Berichte* IX, p. 820). The phenylsemicarbazine was prepared from this according to the method of Burkhardt and Curtius (*J. für practische Chemie* 58, p. 208).

The condensation of the acetonyl acetone with the phenylsemicarbazine was carried out in the same manner as Pickett performed it in his work. One g. of acetonyl acetone was added to 13 cc. methyl alcohol, containing one mol. proportion of the phenyl semicarbazine. After thirty minutes the action was complete and the white granular precipitate was filtered off, washed with CH_3OH dried and M. P. taken. This showed it to be a mixture.

In order to purify the mixture a study of solubility was carried out. All usual organic solvents were employed, CS_2 giving best results. Study shows one compound present almost insol. in any organic solvent. This is obtained pure by extracting the soluble lower melting compound away. The higher melting one melts at 212 degrees and is granular. The lower melting compound crystallizes from CS_2 on cooling in needles. M.P. 136-138 degrees. Lower melting body is present only in very small amounts, less than 5%.

Product dissolves in hot glacial acetic acid and gives a product on cooling that melts 240 degrees and is red. This reprecipitated from glacial acetic acid shows acetate test. It was next tried to brominate the compound in the acetic acid solution. Red product is obtained which shows presence of Br. in the ring but is impure as it does not melt under 300 degrees.

Analyses of these products and the further development of their derivatives is under study and is to be made the subject of the Ph.D. dissertation.

ALVIN S. WHEELER AND B. NAIMAN. (M. S. Thesis, 1922). Hydroxy-naphthoquinone studies *VI*. New Derivatives of 2-Bromo-5-Hydroxy-Napthtoquinone (Monobromojuglone).

Monobromojuglone (A) was first prepared by Wheeler and Scott (*Jour. Am. Chem. Soc.*, 41, 833, 1919). Difficulty was encountered in attempting to prepare this compound according to their method, so a new process was worked out. This method consists in shaking juglone, suspended in glacial acetic acid, with molecular proportions of bromine. The dibromide, which forms in solution, is precipitated by pouring into water. The yellow product is dissolved in absolute alcohol and refluxed to remove HBr, and the monobromojuglone forms in reddish-brown needles. Treatment with benzoyl chloride gives the *Benzoate*, $C_{10}H_4O_2OCOC_6H_5Br$, lemon colored needles melting at 222 degrees from

benzene. Calc. for Br., 12.16%. Found 22.41%. *2-Chlorojuglone* (B) (Wheeler & Dawson) was prepared by heating a solution of (A) in absolute alcohol containing dry HCl. Treatment of (B) with benzoyl chloride gives the *Benzoate*, $C_{10}H_4O_2OCOC_6H_5Cl$, as yellow needles melting at 222 degrees from benzene. Calc. for Cl, 11.36%; Found 11.45%. By warming a solution of (A) in glacial acetic acid and 1 mol. Br, the dibromojuglone (C) $C_{10}H_3O_2.OHBr_2$ is obtained as golden orange needles melting at 169 degrees from CCl_4. Calc. for Br. 48.21%; Found, 48.27%. Treatment of (C) with acetic anhydride yields the *Acetate* $C_{10}H_3O_2.OCO.CH_3Br._2$, as light yellow needles melting at 172 degrees from alcohol. Calc. for Br. 42.78%; found 43.05%. *Dichlorojuglone* (Wheeler and Scott) was obtained by warming dibromojuglone in a solution of absolute alcohol containing dry HCl. as golden bronze needles, melting at 153 degrees. Calc. for Cl, 29.19%; Found 29.40%. A *hydroxy-derivative* was prepared by heating a solution of (C) in alcohol with 10% NaOH and neutralizing with H_2SO_4. This product is yellow and crystallizes as red needles from alcohol, which turn yellow again upon drying in an oven. It melts at 192 degrees. This thesis describes attempts to oxidize (A), attempts to prepare its sodium salt, and other derivatives, and discusses the position of the halogen atoms.

ALVIN S. WHEELER AND ARTHUR P. SLEDD (Master's Thesis, 1922). The Constitution of Oxyjuglone.

The object of this investigation was to determine the relative positions of the hydroxyl groups of oxyjuglone and thereby determine its constitution. In the previous work done on oxyjuglone by F. Mylius (Ber. 18, 463) the constitution of oxyjuglone was considered to be a *hydroxynaphthaquinone*, $C_{10}H_4O_2(OH)_2$, (B), in which the hydroxyl and quinone groups were not in the same benzene nucleus.

The devising of a more practical method for preparing oxyjuglone was undertaken and one which promises well consists of reducing an ether suspension of juglone to *hydrojuglone*, $C_{10}H_5O_2(OH)$, (A) with dilute sulfuric acid and zinc, and precipitating the hydro-juglone from ether solution with carbon di-sulfide. The hydro-juglone is then oxidized to oxyjuglone with alkaline potassium ferri-cyanide solution, and the resulting oxyjuglone purified by converting it into the di-sodium salt and reprecipitating from solution with acid. The purified product is then taken up in ether and reprecipitated with ligroin. Melting point 212 degrees.

The first derivative prepared was *anilino oxyjuglone*, $C_{10}H_4O_2$ (OH) (NHC_6H_5), (C), which was made by refluxing anilin with oxyjuglone in alcoholic solution. The ethylation of oxyjuglone gave *di-ethyl oxyjuglone*, $C_{10}H_4O_2(OC_2H_5)_2$, (G). This was effected by converting oxyjuglone into the *di-sodium salt*, $C_{10}H_4O2(ONa)_2$, (E), and reflux the same with ethyl iodide. The bromination of oxyjuglone gave a *mono-bromo oxyjuglone*, $C_{10}H_3O_2(OH)_2Br$, (D). This was done by heating oxyjuglone with molecular proportions of bromine in glacial acetic acid. An attempt to prepare both mono- and di-bromo derivatives resulted only in the former. This product can be recrystallized from alcohol, but a more practical method of purification consists of sublimation under reduced pressure, which gives golden yellow needles subliming at 150 and melting at 197 degrees.

DEPARTMENT OF CIVIL ENGINEERING

The Department is actively coöperating with the State Highway Commission in research connected with the construction of highways. During the past year a research fellow has been at work, spending his time in part at Raleigh and in part in Chapel Hill. During the coming year two research fellows will be engaged in these investigations, which are directed jointly by the Department of Civil Engineering and the State Commission. An additional research fellow will spend his entire time at the University.

T. F. Hickerson has been at work upon a new method for laying out transition spirals for sharp curves on highways.

The alignment of railroads and highways consists primarily of a series of straight lines and circular curves. At the junction of the straight tangent and circular curve there is an abrupt change of curvature from zero to the full amount of that of the circle. If the curve be sharp, a transition or easement spiral should be introduced between the tangent and circle so as to produce a gradual change from the one to the other. Also, superelevation of the outer edge of curves is necessary to balance the centrifugal force caused by bodies moving in a circular path. Superelevation must necessarily be done gradually. Easement and superelevation provide both com-

fort and safety to traffic. The railroads have long recognized the necessity of this practice. It is only recently after the advent of automobiles and hard-surfaced roads that highway builders have begun the practice of superelevating sharp curves. The easement curves used have been only approximately correct due to the difficulty of applying the methods as given in books on railroad engineering. At present, the various state highway departments have adopted special methods of procedure in laying out these transition spirals, all of which are different and more or less complicated with superfluous variable data. Obviously one simple uniform method is highly desirable. The purpose of the investigation has been to simplify transition spirals by deriving formulas and compiling tables based on a constant *spiral angle* equal to three-tenths of the external deflection angle; so that if the original circular curve is divided into ten equal parts, the spiral will coincide with the circle at the third point of division divided into sixteen equal parts. The so-called *unit curve* has sixteen equal divisions of ten feet in length. The parts of any other curve are multiples of the *unit curve*. The tables give all the parts of the *unit curve* covering a wide range of cases that may occur in practice. The results have been computed and checked to the nearest ten-thousandth of a foot, by means of a calculating machine and seven-place logarithms. Several field tests have demonstrated that by means of these tables the transition spiral may be located with no more difficulty than that of the simple circular curve, in six different ways, each of which finds appropriate application under certain local conditions. The six ways of procedure require the instrument to be placed in only one position. These are as follows: (1) by deflections from the P.I. and equal chords around the curve; (2) by both deflections and distances from the P.I.; (3) by deflections from the T.S. and equal chords around the curve; (4) by both deflections and distances from the T.S.; (5) by offsets from the tangents; (6) by offsets from the long chord.

THORNDIKE SAVILLE AND M. A. HILL have conducted an extended investigation of sands used in rapid sand water filtration plants in the United States. As a part of this study some forty sands used in plants in North Carolina have been analyzed at the request of the State Board of Health, which has used the analyses in making reports upon the performance of these plants. The results of the entire study are to be published in the *Journal of the American Water Works Association.*

Mr. Saville and Mr. Paull have been engaged upon a study of the effect of dosing natural waters with aluminum sulphate and its relation to change of the hydrogen in concentration and corrosiveness of such waters. As a part of this study, investigations have been made and are being carried on to discover a colorimetric method for the quantitative determination of alum in the effluents from water purification plants using aluminum sulphate as a coagulant.

Mr. Saville, with assistants, has been engaged in collecting and revising data on stream flow for the N. C. Geological and Economic Survey. This has necessitated investigation of the daily and monthly flow of some thirty streams in the state at about fifty gauging stations. This data is being worked up for publication in a bulletin of the Survey.

The following articles have been published:

The Water Power Situation in North Carolina. Circular 2, North Carolina Geological and Economic Survey. Printed also as Chapter IX of 1921 Report of Department of Labor and Printing.

Interconnection of Public and Private Water Supplies for Fire Protection. Published by State Board of Health. Reprinted by *Fire and Water Engineering*, May 26, 1922.

A series of monthly articles on subjects connected with water supply and purification, and sewage treatment for *Lefax Technical Progress Bulletin.*

In press, Water Powers of Surry and Wilkes Counties. Bulletin of the N. C. Geological and Economic Survey.

H. F. Janda, assisted by R. P. Morton, Research Fellow in Civil Engineering. Experiments undertaken to determine the effect of drain pipe on capillary water.

At the suggestion of Mr. C. M. Upham, State Highway Engineer, a series of experiments is being undertaken to determine the effect of drain pipe on capillary water. Knowledge that will be gained from these experiments will have an important bearing on the drainage of highways. The experiments are under the direction of Mr. Janda, who designed the apparatus. Mr. Morton, with this apparatus, has made certain tests on clay, top-soil, and sand-clay, and the results obtained are interesting and instructive. A final report will be published at an early date.

DEPARTMENT OF ECONOMICS AND COMMERCE

Under the direction of D. D. Carroll and C. T. Murchison, the survey of the business resources of North Carolina will be continued in accordance with the plans laid down last year. In this work the graduate students of the Economics Seminar will coöperate with the faculty members. The survey embraces an analysis of the scope and volume of manufacturing activities; the type and size of plant; kinds, sources, and costs of raw material; value added by manufacturing process; destination of product; sources of capital, and prevailing methods of financing enterprise; kinds, quantities, and sources of power used; method and adequacy of transportation; the volume, quality, and source of the labor supply. It is intended to publish the results of the undertaking in bulletin form within another year.

C. T. MURCHISON has published during the year a series of articles on resale price maintenance as follows:

The Latest Work in Price Maintenance. *The Annalist,* February 13, 1922.

New Light on Price Maintenance. *Drug and Chemical Markets,* February 15, 1922.

Resale Price Maintenance. *North Carolina Law Review,* June, 1922.

Recent developments relative to the methods of exercising price control over trade-marked commodities after they have passed from the hands of manufacturers. The economic significance of the United States Supreme Court decisions in the Colgate and Beechnut cases. A likelihood that they will occasion important changes in the machinery of marketing manufactured specialties. The present legal status of price maintenance.

The Conquest of the Business Cycle. *Administration,* June, 1922.

An examination into the causes of the cyclical fluctuations in industry with the view of ascertaining the limits within which human control over these fluctuations is possible.

Mr. Murchison also has under way for early publication the following studies:

State Banks and Par Clearance. A study of the par clearance controversy in its legal and economic aspects. To appear in the October issue of the *North Carolina Law Review.*

A monograph embracing a detailed study of cyclical fluctuations in industry. An attempt will be made to analyze each of the various stages of the business cycle: crisis, panic, depression, prosperity; and to indicate its influence on production, the rate of interest, capital, investments, wages and employment, price movements, consumption, and the volume of trade.

Walter J. Matherly has published a study entitled "The Costs of Labor Turnover." (*Administration,* April, 1922.)

The costs of labor turnover are treated from the points of view of employer, employee, and the general public. A constructive criticism of the various methods used in calculating such costs is offered, together with special recommendations relative to the ascertainment of employers' costs.

Fundamental Ways of Reducing Labor Turnover. A study now complete and awaiting publication.

This study deals with the more fundamental methods of reducing labor turnover, attacking both the internal and external causes of labor immobility. In presenting ways and means of establishing greater personnel stability, special emphasis has been placed upon: 1. The agreeableness of the work; 2. The regularization of the job; 3. The scientific adjustment of the length of the working day; 4. The payment of attractive wages; 5. The adoption of more effective machinery for personnel supervision.

Mr. Matherly also has in preparation for early publication a study of the Southern Textile Industry. It will be presented in four parts as follows:

"The Recent Growth of the Southern Textile Industry," a study of the industry's development from 1910 to the present time.

"The Present Status of the Southern Textile Industry," an examination into the factors making for the greatness of the South's textile activities, the reasons for the localization of the industry. An evaluation of present needs and tendencies.

"The South's Position in the Textile World," a comparison of the Southern Textile Industry with that of New England, and with the textile industries of other nations.

"The Future of the Southern Textile Industry," a discussion of the limits of future textile expansion in the South.

An additional study is being prepared bearing upon the evolution of scientific business methods. It will have to do with the contributions to the science of business which have been made by engineers, chemists, psychologists, and physiologists.

HOMER HOYT has published the following articles:

The Future of Manufacturing in the United States (*Annalist,* March 13, 1922).

Our strength as a nation depends on the continued expansion of our manufacturing. Such expansion is conditioned upon lower costs of manufacturing which can be achieved only by standardization.

Trade Associations and the Sherman Act (*North Carolina Law Review,* June 1922).

A discussion of the hardwood lumber case and its effect upon the legality of the trade association. The holding of the Supreme Court in this case is criticized because of failure to give proper weight to the effect of the business cycle and of economic laws upon the course of hardwood prices. The decision, if logically applied, indicts the entire business structure of the nation.

"The Economic Future of the United States," scheduled for publication in an early issue of *Administration,* is a brief survey of the forces responsible for the rapid economic development of the United States within the past century and an inquiry into the possibility of the continued operation of these forces in the future.

Research in Progress includes the following:

"Standardization in the United States," a detailed report on standardization in all lines of manufacturing in the United States, and the effect of standardization upon consumer, laborer, manufacturer, and the business structure generally.

2. "The Building Industry in the United States," a statistical study of the volume of building and of the production of building materials, with special reference to their effect upon the business cycle.

3. "The Specific Productivity Theory," a study of the environment which produced the theory, its original purpose, its present extent and limitations.

4. "The Equilibrium Between Manufacturing and Agriculture in the United States," a discussion of the necessity of maintaining a proper balance between these two great divisions of industry.

DEPARTMENT OF EDUCATION

EDGAR W. KNIGHT has published his history of education in the South in a volume entitled *Public Education in the South.* This is the first attempt to give in a single volume the growth of public educational organization and practices in the eleven Southern States which formed the Confederacy. Public educational problems of today are set forth in the light of their historical growth. It is a volume of 494 pages and is published by Ginn and Company. It contains complete bibliographies of the various periods.

Mr. Knight continues his preparation of *Readings in Southern Educational History* to be published as a companion study to his recent volume.

"The Making of Citizens," published by McClurg, is a volume prepared in collaboration with Professor J. G. de R. Hamilton, dealing with methods and means of citizenship training.

The following theses for the Master's degree have been prepared under the direction of Mr. Knight:

Ante-bellum Education in Georgia. By R. N. Ledford.

The purpose of this study was to define the extent of education outlined, developed and practiced in Georgia before 1860. The study deals mainly with those state-wide attempts made during the *ante-bellum* period to organize a public school system suitable for the people and conditions of that State. Little consideration was given to local legislation or to private schools.

The principal sources of information were certain standard secondary materials dealing with the origin and organization, the economic, political, and social conditions of the State and with early educational effort. The primary sources used were constitutional and legislative provisions for schools, messages of the governors, official reports and documents.

The result of the study shows that Georgia during the *ante-bellum* period provided a very small amount of public funds for public education, in comparison with most of the other Southern States. It also shows that the people of the State received even less in return for the money actually spent than the annual expenditures suggested. This slight return was accounted for by the defects of the school system.

Two other findings are unmistakable: The State attempted to educate her children before 1860 without providing sufficient funds; and class distinctions prevailed to such an extent in school legislation and in school practices that the educational work carried on failed to receive the respect or support of any one class of the people. As a result public education in Georgia during the *ante-bellum* period was in a very unwholesome state. At no time, moreover, during that period did the entire school population of Georgia have access to public schools.

The Development of the County Superintendency in North Carolina. By H. V. Bailey.

The purpose of this study was to determine as definitely as possible the present status of the county superintendency of North Carolina. To this end it was necessary to trace briefly the growth of the idea of supervision, the evolution of the county superintendency in general, and the development of the county superintendency in North Carolina.

In this study the best works on administration and supervision, the reports of the State Superintendent of Public Instruction and of the United States Commissioner of Education, and the public laws of North Carolina were used as the principal sources.

Information in regard to the present status of the county superintendency in North Carolina was secured from the State Department of Education, and from questionnaires sent to the county superintendents.

The beginning of the county board of education in North Carolina appears with the creation of the board of county superintendents by act of the legislature of January 8, 1839. The county superintendency evolved from the chairman of that board.

The office of the county superintendency was created by act of the legislature of 1881 and it has been in force since that time except for the period between 1895 and 1899, and during the last two years of that period there was a county supervisor with the powers and duties of a superintendent.

It was found from studying the questionnaires and the facts furnished by the State Department of Education that forty-six of the ninety-seven superintendents reporting are working in their native counties. This leaves fifty-one who are not natives of the counties in which they are working, ten of them being from other states. The oldest superintendent is seventy-one, the youngest one is twenty-five, while the median age is forty-one. Sixty-three reported work in education ranging from one course to thirty-two courses. Forty-eight reported having engaged in no other occupation than teaching and supervision. Of those who have engaged in other occupations, twenty-seven have farmed. Forty superintendents have full-time office assistants, twenty have part-time assistance, while thirty-seven have no office assistance. The superintendents reported experience ranging from two to forty years with fifteen years as the median. The smallest annual salary reported was $1,000.00, the largest $4,500.00, and the median $2,400.00.

From these facts it appears:

1. That the field from which superintendents are selected should be greater than the local county.

2. That a superintendent should have considerable experience before being appointed, and yet care should be taken to get a man who is young enough to be energetic.

3. That at least the A. B. degree or its equivalent should become the minimum academic requirement for the county superintendent.

4. That each candidate for a superintendency should show acquaintance with the problems of administration and supervision.

5. That only professional school men should be chosen for superintendents.

6. That superintendents should have more office assistance.

7. That there are not enough supervisors, superintendents of public welfare, and other special county officers.

8. That the superintendent's salary is too low in many of the counties.

Graduate students in Mr. Knight's Department continue studies in American educational history and rural education, as follows:

E. M. Highsmith is completing his study, "Some Standards of Practice and Current Tendencies in the Administration of Curricula in American State Normal Schools." (Ph.D. thesis.)

Arthur Ranes, "The Ante-bellum Educational Revival in the South."

R. K. Hancock, "Consolidation of Schools and the Transportation of Pupils in North Carolina."

C. H. Weatherly, "Public Education in South Carolina Before 1860."

R. R. Anderson, "Social Studies in the Rural High School."

C. L. Cates, "The County Superintendency in Virginia."

Thomas W. Sprinkle, "Education in Mill Villages."

G. Y. Newton, "Negro Education in the South."

W. M. Pickens, "Science in the Rural High School."

H. C. Renegar, "Problems, Policies, and Achievements of the State Superintendents of North Carolina."

L. A. WILLIAMS continues his work on the *History of Secondary Education,* a text-book. At present he is investigating the influence of economic and social conditions upon the establishment of the high schools in the United States.

He has prepared a paper on *The Economic Motive in the Section on Education in the Northwest Ordinance,* which he presented before the graduate group in the School of Education.

A study has also been begun by him on the types of research method commonly used in the study of educational problems, and evaluation of them. This study is as yet in only the very earliest stages.

The following theses for the Master's degree have been prepared under the direction of Mr. Williams:

A Study of the Intelligence Levels of a Group of Cotton Mill Village School Children. By L. H. Jobe.

This investigation is an attempt (1) to arrive at a tentative conclusion concerning the intellectual status of mill village school children as a social group, by using certain selected group intelligence tests in one system made up of such children; and (2) to arrive at a final conclusion concerning this one group of children in particular as measured by these selected tests.

The data used in this study were gathered from a unit of a school system in this State where the pupils are largely children of parents employed in the cotton mills. The data were secured by administering the Haggerty Intelligence Examinations, Delta 1 and Delta 2, on November 8 and 9, 1921, and the National Intelligence Test, February 7 and 8, 1922, to the pupils in this system. From these data, tables and graphs were prepared setting forth the results.

The tentative conclusion concerning cotton mill village school children as a social group is to the effect that as measured by the Haggerty and National group tests such children are below the normal in intellectual ability.

It was found that large percentage of this particular group of cotton mill village school children were of subnormal intellectual ability, for:

1. When measured by the same tests as, and compared with, a similar system, the results presented a situation practically the same in the two systems.

2. When measured by a different test at different times, the results disclosed a high correlation between the results of the two tests, indicating a similar condition.

3. When supplementary data are studied both in detail and in general from both of these testings, similar situations were found to prevail, namely, that these pupils are, on the whole, chronologically below-grade, pedagogically at-grade, and mentally above-grade.

This treatise goes on to make certain specific and practical suggestions as to the use of the results of this study in this specific system with the application to similar systems.

Finally, a supplement is added to the main study, making certain suggestions concerning other necessary pieces of research before a final and definite conclusion as to the intellectual status of mill village children as a whole can be determined.

The Status of the Public High Schools in Rowan County, North Carolina. By Ida Belle Ledbetter.

The study is based on the United States Census Report, the State Superintendent's Report, reports of the high school principals and superintendents, reports of the elementary school principals, the County Superintendent's reports and the County Auditor's report for the school year 1919-1920.

The facts revealed by this study show that Rowan is a financially prosperous county, but the school system does not reflect this prosperous condition. The buildings with few exceptions are defective. The equipment in all respects and for all types of schools is entirely too meager. The schools are too small and the school term too short to do efficient work. There are a number of elementary schools doing first year high school work when the time, money, and effort thus spent should be given to grade work. The course of study is narrow and not suited to the needs of the pupils. The attendance is irregular and pupil elimination is too great. The schools also suffer from a lack of supervision. The teachers are poorly paid and poorly prepared. As a rule the teachers do not remain in the same school long enough to do efficient work. The school fund is too small and unequally distributed.

The recommendation is to organize the school system on the basis of the county as a unit of taxation and administration. Also to divide the school system into three periods instead of two. That is divide the organization into elementary schools, junior high schools and senior high schools. Then with consolidation and transportation the schools could be organized so as to place a well equipped high school within easy reach of every boy and girl in the county.

Legal Provisions in North Carolina for the Care of Unfortunates. By Emerson Leroy Carter.

This study is incomplete but data have been secured concerning all legislative enactments down to 1901. The problem is to show the growing consciousness of the State as to its responsibility toward proper care of its unfortunates as revealed by legislation, actual or proposed. A preliminary report has been presented.

DEPARTMENT OF ENGLISH

EDWIN GREENLAW spent part of the year in study in Cambridge and Chicago, devoting himself chiefly to work on several topics connected with the history of learning in the English Renaissance, the effect of the new science on literature, and special topics in Spenser, Bacon, and Milton. As chairman of the Spenser-Milton group of the Modern Language Association of America, he has been collaborating with other scholars on topics connected with the study of these authors, one result being the planning of a

variorum edition of Spenser to be prepared by a group of American scholars. The following papers were contributed during the year:

An Elizabethan Humanist. A paper presented to the Philological Club, October, 1921.

The paper dealt with the personality of Gabriel Harvey as revealed in his Marginalia and other writings. His appreciation of the value of bibliography and his wide reading not only in the classics but in the serious literature of his own time; his emphasis on action and interest in the achievements of "men of the Roman temper" in his day; his study of human conduct which resulted in brief and often penetrating analyses, all indicate a man of broad interests. His notes on Quintilian, apparently prepared for class-lectures, show that he must have been a vigorous and alert teacher. He was of his time in the value that he put on the search for personal distinction; in his belief that contemplation is a necessary preparation for action, but that action is the test of the ideal life; in his belief that a man should serve his state. His interest was in the present life, not in a mystical religion, Platonic or otherwise. The parallel with Bacon is useful: both were men of wide reading, fond of anecdote and pregnant saying, fond of annotating men and matters, distrustful of facile generalization and of mere style. Both believed that the court was the scene of honor and accomplishment, distrusted meditation, loved action and great actors. But Bacon became a man of action while Harvey remained a spectator.

A Chapter in the Early History of Research. A paper read before the Graduate Club, May, 1922.

Sprat's *History of the Royal Society* is usually neglected by students of literary history but merits attention because of its charm of style, its relation to Bacon's *Advancement of Learning*, and its enthusiasm for research. The book illustrates a spirit of inquiry analogous to that shown in the additions to geographical knowledge made by the Elizabethan travelers, in the exploration of space by Copernicus and Galileo, in the exploration of the field of thought by Bruno and Bacon. Passages were cited in illustration of these points, and applications were made to some of the problems of university research at the present time.

JAMES F. ROYSTER is continuing his work on English verb-compounds in a study of the *going to* future. The investigation is being made in collaboration with Professor J. M. Steadman, Jr., of Emory University. The following monograph was published:

Old English Causative Verbs. *Studies in Philology,* July, 1922.

An investigation into the use of the two means of causation—the directly converted causative verb and the causative periphrasis—in the Old English written record. It is determined that the periphrasis (with *don, lætan, macian, hatan*) is infrequently employed in the remains of the standard literary language; it is argued that the construction was very probably common in the Old English vernacular (with a following infinitive); it makes its first extensive appearance in Middle English, at a time when rigid formality of Old English literature had been discarded as a tradition. The behavior of the Middle English language toward the expression of causative action is now under investigation.

NORMAN FOERSTER. The book, *Nature in American Literature,* mentioned in last year's report, will be published in the autumn or winter by The Macmillan Company. Chapters, or parts of chapters, of the book have been published during the past year in the *North American Review* and other journals, and the greater part of the chapter on Emerson is to appear in the *Publications* of the Modern Language Association in the issue of September, 1922.

Mr. Foerster is now at work upon a book on *Literary Criticism in America.* He has written a chapter on Poe, an excerpt from which he read before the American Literature group of the Modern Language Association at the meeting held in Baltimore, December, 1921.

THORNTON S. GRAVES has published:

Some facts about Anthony Aston. *Journal of English and Germanic Philology,* July, 1921.

A running comment on Nicholson's *Anthony Aston, Stroller and Adventurer* (1920), correcting certain statements and supplementing the biographical material contained in the volume.

The Stage Sword and Dagger. *South Atlantic Quarterly,* July, 1921.

A discussion of the two-fold danger arising from duels and battle scenes: (1) ludicrous effect produced by fright, clumsy fencing, etc.; (2) serious accidents resulting from carelessness or realistic acting.

Lapsus Linguae on the Stage. *The Texas Review,* January, 1922.

A presentation of the danger constantly run by actors as a result of tricky or "untalkable" lines, carelessness, or excitement. Some of the most interesting verbal blunders are classified, due attention being called to the unreliability of such theatrical anecdotes.

The Comedy of Stage Death. *South Atlantic Quarterly,* April, 1922.

In support of the contention of the classicists that stage deaths should not occur in sight of the audience are hundreds of ludicrous death scenes resulting from accident, excitement, poor acting, and other causes. The paper presents the more striking instances of such scenes on the English and American stages, attempting in most cases to indicate the trustworthiness or unreliability of the anecdotes selected.

Recent Literature of the English Renaissance. *Studies in Philology,* July, 1922.

A classified bibliography of the important productions of 1921, dealing with the English Renaissance, together with the more noteworthy books of 1920 which were not listed in earlier numbers of *Studies in Philology.* Some of the books included in the bibliography are reviewed briefly, and explanatory notes accompany various articles, the nature of which is not clearly indicated by the titles.

Some References to Elizabethan Theaters. *Studies in Philology,* July, 1922.

A list of contemporary allusions, not hitherto utilized by stage historians, to the nature and practices of the early playhouses.

HENRY M. DARGAN is at work on "The Concept of Authority" as it appears in seventeenth century and eighteenth century literature. The purpose of this study is to determine, more clearly than has been done heretofore, the character of a chief factor in the conflict of romantic with classic and pseudo-classic tendencies in literary criticism and philosophy. A portion of the first chapter, dealing with the philosophy of Hobbes and of Locke and with the criticism of Rymer and Dryden, was read at a section-meeting of the Modern Language Association in Baltimore in December, 1921.

C. A. HIBBARD published the following:

Studies In Southern Literature, University of North Carolina Bulletin, April, 1922.

This bulletin contains programmes for the study of some of the more prominent writers of the South with especial emphasis on a few North Carolina authors. In addition to biographical material, bibliographies of the literature of these men as well as critical references are cited. The purpose of the bulletin is to lead the student to a personal and unbiased estimate of Southern literature of the past and present.

Abstracts of theses submitted in June, 1922, for the degree of Master of Arts in the Department of English are appended:

The Development, Trend and Aims of Contemporary Middle Western Literature in the United States. By Jonathan Worth Daniels.

The historical development of the literature of the Middle West is traced. The better to do this, the history of that literature is divided into three periods, the period of the pioneer, the period of the Philistine and the present-day period of the critical realist. The pioneers began the literature of the region in the rebirth of national consciousness that followed the civil war and much of their work was a part of the regionalistic movement in American literature. The Philistines, as the writers of the second group are designated, were of that later period in the development of the Middle West when increased prosperity and permanency of population made

the people and the writers complacent and proudly provincial. The writers of the present day, the critical realists, are characterized by questionings into the social and economic order and by a realism of the most thorough-going type.

Chapters Toward a History of American Librettos. By Thomas Hoffman Hamilton.

The introductory chapter shows that opera was originated with the intention of using music to enhance the drama in the manner in which it was believed the Greeks used it. As opera developed in Italy the oratorio form was grafted on to it, with the pernicious result of subordinating the drama to the musical form, a decadent phase from which it was finally delivered by the work of Wagner, who once more made it a drama with music attending and growing out of it, but never dominating it.

Chapter Two sets forth the beginnings of drama in America. Opera and drama are shown to have been closely allied in the public mind, and given indiscriminately by all dramatic companies. The wide-spread antagonism to the theatre is shown to have retarded development of native drama and opera. The standards of public taste, of criticism, and the resources available for the production of original opera are discussed.

Chapter Three is a chronological account of the librettos that were written in America during the eighteenth century. The histories of Dunlap and Seilhamer, and the later research of Sonneck are summarized. The chief foreign influence was the English ballad opera. The conditions of race, environment, and epoch which are necessary to the production of great opera were not present. Native American opera in the eighteenth century was a volunteer crop where no seed had been designedly sown. These librettos were the result of individual attempts to produce an entertainment, rather than a conscious effort to extend the development of the art. None of them seemed to contain any promise for a truly national art, as distinct from English opera. They represent the first groping steps of a nation learning to express itself in a form yet unmastered, and to the technique of which little attention had so far been paid.

Mysticism In Spenser's *Fowre Hymnes*. By Hubert Crouze Heffner.

The primary object of this work is a study of Spenser's *Fowre Hymnes* as a typical piece of mystical literature representing a mystic

journey culminating in a beatific vision such as attained by Dante in the thirty-third canto of his *Paradiso*. Chapter I is a brief review of the contents of the *Fowre Hymnes*, showing that they are not antagonistic poems but are a complete and continuous whole, representing the soul's rise from romantic earthly love to a union with God in the spiritual life of Heavenly Love. Chapter II begins with a review of the principal ideas of mysticism in general, followed by a discussion of the Neo-Platonic and the medieval doctrines of love. Then, from the summary of Miss Lillian Winstanley's *Introduction to The "Fowre Hymnes"* and Mr. J. B. Fletcher's two articles dealing with the influence of renaissance mysticism on the *Fowre Hymnes*, it is shown that the first two *Hymnes* are a product of the Platonic and Neo-Platonic theories of love and beauty and are the final link in a chain of doctrinal odes on love. This is seen, however, to fail to explain the last two *Hymnes* which are essentially dominated by medieval thought and doctrine. Chapter III shows that the medieval elements in the *Fowre Hymnes* are a part of Spenser's medievalism in general, and by a summary of their philosophy points out these elements in detail, showing: (1) that the *Hymnes* represent the four progressive stages of a medieval mystical journey; (2) that their theory of the relations of man to God is essentially medieval; (3) although Spenser's conception of Sapience is influenced by the renaissance Platonists the vision as a whole is essentially a medieval mystic vision, comparable to that of St. Bernard of Clairvaux, Dante, and other mystics of that period.

The Auxiliary Use of *Get*. By Walter F. McCanless.

The object of this paper is to establish the fact that the general usage of *get* puts it in the class of auxiliary verbs.

The material used as a basis for the study is a number of modern plays, novels, and formal essays by both English and American authors. These writings, which reflect the usage of various language levels, disclose the fact that *get* is employed in copulative, reflexive, voice, modal, inchoative, and tense relations.

Since these relational usages find a parallel in modern everyday speech, the conclusion that *get* is rightfully an auxiliary is warranted.

The Attitude of the Restoration toward James Shirley. By Roland Prince McClamroch.

In the introductory section of this paper, the disparaging opinion that has prevailed concerning James Shirley's position in the Restoration period is pointed out. However, as the opinions of the dramatic

historians were apparently based upon no concrete evidence, such evidence is brought together here, so that a just estimate of the attitude of the Restoration period toward James Shirley may be formed. The treatment is divided into three main divisions: (1) the general allusions to Shirley, both favorable and unfavorable, from the extant works of the miscellaneous writers of the period 1660-1700; (2) the theatrical performances and reprints of his plays between the same years; (3) the borrowings which Restoration dramatists made from his plays. In the first instance, frequent mention of Shirley's name in favorable conjunction with the names of Shakespeare, Jonson and Beaumont and Fletcher, was made. In the second and third consideration, more than half the number of his thirty-three plays was found to have contributed to the theatrical history of the period. Hence, contrary to the opinion which has prevailed the evidence collected is sufficient to justify the conclusion that Shirley, instead of being ignored during the Restoration period, was mentioned frequently by the critics, students, and dramatists, some of the latter not hesitating to borrow from his plays, and that with the exception of the plays of Shakespeare and Beaumont and Fletcher his plays enjoyed more revivals than those of any other Elizabethan dramatist.

Masque Elements in Spenser's *Faerie Queene.* By Mary James Spruill.

The purpose of the essay is to point out the fact that passages in the *Faerie Queene* conform to a definition of the masque which was evolved from a study of the descriptions of masques of Spenser's time. These descriptions are in accounts of entertainments found in letters and manuscripts and in account books of the time. The masques were found to possess the following well-defined characteristics: (1) they were written for special occasions; (2) they conveyed a hidden meaning; (3) the characters were mythological or abstract figures; (4) the costumes and symbols portrayed the nature of the characters; (5) the action consisted of riding or marching in procession, and of dancing; (6) there was music during the performance.

The anti-masque, given sometimes alone, sometimes as a part of the regular masque, differed from the latter in its queer-looking characters and odd dances.

By analyzing six passages in *Faerie Queene* and comparing them with the definition, it was ascertained that they possess the elements of the masques of Spenser's time, and were evidently modeled on them.

It was further shown that Spenser was influenced in writing these masques not only by the entertainments of his time but by his knowledge of Ovid and Lucretius, of folk-lore, of Italian literature, particularly Ariosto's work, and of Gower and other writers of the love allegory. It was this wide knowledge connected with the ability to present vivid as well as beautiful pictures, that made Spenser write such beautiful masques, and that would have enabled him to become famous as a writer of the regular masque, if he had chosen that field.

Platonic Ideas in Bacon. By Wilbur White Stout.

In order to show the influence of Plato on Bacon and the presence of Platonic ideas in the Baconian philosophy, an examination of Bacon's philosophical writings was made with particular attention to the idea of truth and the related idea of imagination.

It was found from a parallel consideration of these ideas in Bacon and in Plato that the two are in agreement. Both think that truth may be attained by the individual if the individual knows the right method and applies it correctly. With Bacon, the inductive method was the key; with Plato, it was the dialectic, but in both cases it was an instrument for the betterment of mankind.

In the essay *Of Truth*, in his more extended writing on the same subject, and in his own life work, Bacon held truth to be (1) correctness of thought, or the correspondence between facts and our opinions about them. The Platonic idea of truth was the unity of the individual concept with the reality incorporated in the particular. (2) After truth in thought comes truth in action, so Bacon's second point was that the application of truth leads to integrity of conduct. Bacon did his best to put this theory into practice. The *Great Instauration* shows the ambition he had through life, to formulate a system for the finding of truth. The truth Plato held was to be of practical advantage to mankind. Plato held the same view. His ethics was the application of the truth found by the dialectic. So Bacon's idea of truth was essentially the same conception as that held by Plato.

The world of fancy stands over against the world of truth. When the report of the imagination differs from the report of the reason, then Bacon holds with Plato that only the reason is trustworthy. Both Bacon and Plato speak in justification of poesy and imaginative literature, but agree that truth is superior. The imagination may show a world that is pleasing, but Bacon says that when one has experienced the pleasure which comes from the seeking and finding

of truth, there will be no need for pictures that are fanciful and false.

Plato thought of the poet as one who pictures things in the world of appearances while philosophy deals with the real world of ideas, so in comparison with philosophy poetry is not only useless, but deceptive and harmful. Because of its mundane nature, poetry exercises and strengthens the irrational elements in man. Where philosophy encourages self-control, poetry gives the emotions free play and makes over indulgence easy.

Though a renaissance hatred of restraint made Bacon disregard the classical source of some of his own philosophy so that he was probably not conscious of any debt to Plato, still there is true Platonism in his idea of truth and in his idea of imagination.

DEPARTMENT OF GEOLOGY

Collier Cobb. The following papers have been presented:

Physiographic Processes in Relation to Harbor Development. Elisha Mitchell Scientific Society, Oct. 11, 1921. Abstract in *Mitchell Journal,* Vol. 38, September, 1922.

The Echigo Oil Fields of Japan.

The Sand-dunes of Nügata. North Carolina Academy of Science.

Research in Progress:

1. Detailed Studies of Certain Pacific Harbors.
2. The mineral analsyes of lime sands from Pacific shores as compared with those from the Atlantic shores and the Mediterranean.

William F. Prouty has published the following articles:

Age of the Telladega Series, Clay County, Ala. *Pan-American Geologist,* July, 1922.

A considerable portion of the Talladega is shown to be of Carboniferous age, that above the conglomerate of Talladega Mountain is of Pennsylvanian age and that to the west and beneath the conglomerate is of Mississippian age. The Hillabee Schist and the Pinkneyville Granite are also shown to be of Post Carboniferous age.

Geology of the Muscle Shoals Area. Elisha Mitchell Society.

The results of a detailed study of the geology of the Muscle Shoals Area, made for the Government during the war, are briefly outlined.

Research in Progress:

1. Study of the Older Paleozoic Fauna in Mercer and Monroe counties, W. Va.

2. Revision of Geological Map of N. C., with Dr. J. H. Pratt.

3. Construction of Geological Map of Chapel Hill Special Sheet.

The following theses were presented for the Master's degree in June, 1922:

Flint-Like Slates of the Jones Ford Quadrangle. By James Bennet Miller.

The Jones Ford Quadrangle is approximately three-fourths of a mile long by one-half mile wide. It takes in land on both sides of Morgan's Creek and is about one and a half miles southeast of Chapel Hill and three-fourths of a mile down stream from Purefoy's Mill.

The topograpical and geological map of Jones Ford Quadrangle herewith published, is the joint work of Messrs. J. S. Babb, W. H. Butt, S. B. Lee and J. B. Miller. To Mr. Miller was assigned the detailed study of the "Flint-like Slates." His conclusion concerning the geology of the area in general and the slates in particular in brief are as follows:

The topography is rather rolling as a rule, but in places rather steep. The area is cut by numerous small-stream valleys, and it is clearly seen that the dissection of the old peneplain whose elevation was from 500 to 550 feet has been the source of the present topography. The streams are adolescent but there is a tendency toward rejuvenation.

The drainage of the whole area is accomplished quickly and thoroughly through Morgan's Creek and its tributaries.

Going from north to south across the area the formations encounted are as follows:

1. Sheared felsite, grading into sheared conglomerate, in some places containing inclusions of slate.

2. The flint-like slate, locally known as Purefoy's slate.

3. The second conglomerate.

4. A narrow contact zone, of metamorphosed material.

5. An andesite porphyry.

All of these mentioned except the last two are of sedimentary origin, but have been altered by metamorphism.

The soils fall naturally into two classes, residual and transported, each having various sub-types. This variance is well shown by the vegetation of the area.

Diastrophic movements have been numerous, beginning with the displacement of the original sediments by the Chapel Mill Mass, followed by both major and minor faulting and by minor folding. A great amount of field evidence is obtainable; however, it will not be given here.

The problem of special study by the writer, is the slate of the area, which extends in an east-west direction and lips from 65 to 75 degrees south. These slates are the part of a great formation of slates, which extends southwestwardly through Virginia, North Carolina and South Carolina and is known as the "Carolina Slate Belt." The writer believes them to be Pre-cambrian in age and of sedimentary origin; probably formed by the consolidation of volcanic sand deposited in a deep sea. There has been considerable metamorphism which makes it difficult to ascertain the structure, but the writer believes there is field evidence enough to prove his contentions.

As to relative age of the rocks of this area, we find that field evidence shows that the sheared felsite and conglomerate No. 2 are the oldest of the series; followed by the slate, conglomerate No. 1, contact product, and andesite porphyry. These rocks are older than the Chapel Hill mass, for they have been displaced by it. The Chapel Hill mass is older than the Triassic to the east, which has been deposited on it, and includes portions of it.

The conclusions arrived at in this work are as follows:

1. That the rocks of the Jones Ford Quadrangle are older than the Chapel Hill mass.

2. That the intrusion of the Chapel Hill mass was the cause of the displacement and metamorphism of the Jones Ford rocks.

3. That there has been later disturbance in the area, and also metamorphism.

4. That there are indications of faulting in the valley which runs north-south, near the middle of the area.

5. That Morgan's Creek has meandered to some extent, cutting out its channel and flood plain; and that its course has been largely determined by the underlying geology.

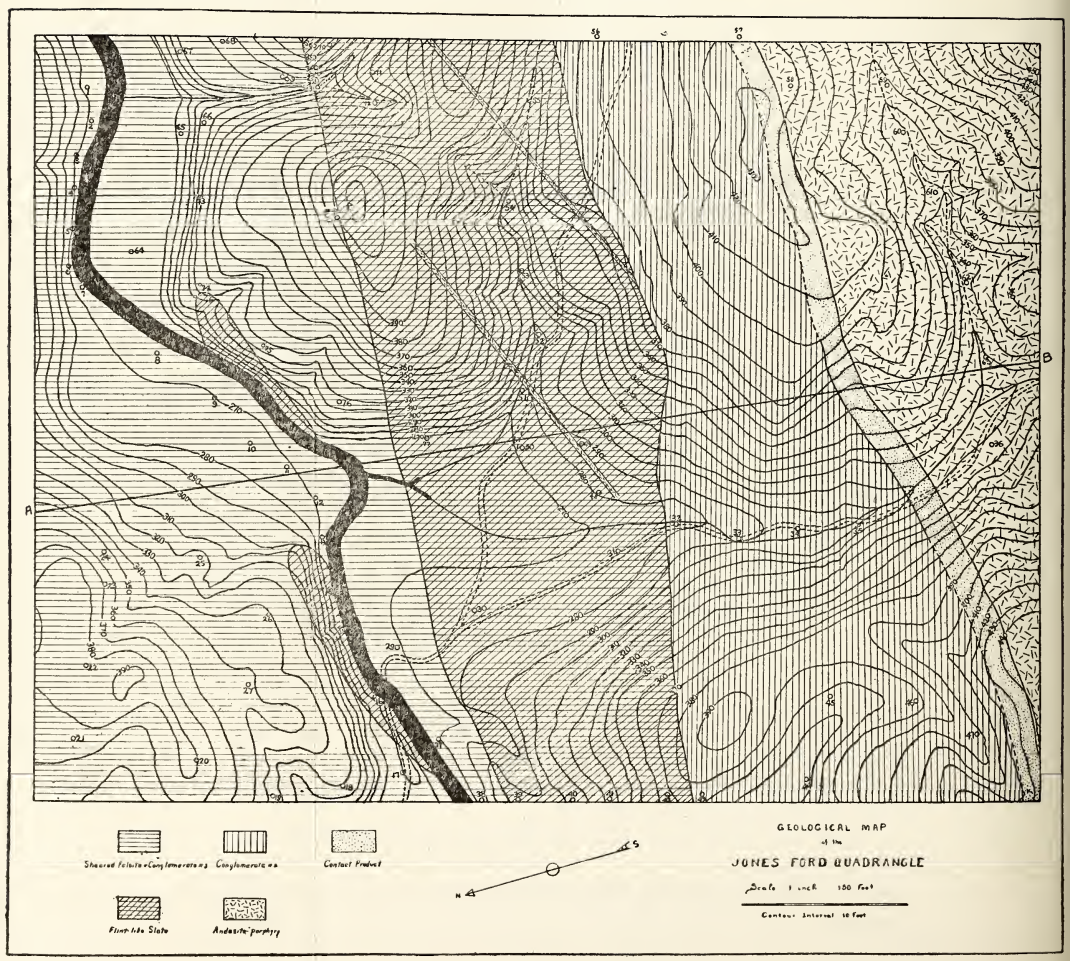
6. That the area was once an old peneplain of from 500 to 550 feet in elevation.

8. That the slates were deposited in a deep sea, being formed of material which was of volcanic origin; and that the apparent sand-

7. That the rocks of the series are sedimentary and have been brought to their present state by metamorphism.
stones, are not sandstones but slates containing a high percentage of silica in the form of detrital quartz and feldspar grains.

9. That the laminations or apparent bedding planes are true bedding planes in some cases, while in others they are due to parallel arrangement of the mineral constituent, brought about by matamorphic action.

10. That the Purefoy Series is Pre-cambrian in age, probably being formed near the close of the Proterozoic period.



Geology of the Southern Portion of the Burhenglen Knob Quardrangle. By Henry Spurgeon Boyce.

Burhenglen Knob Quadrangle is a rectangular area one-half by five-eighths mile in extent with its northeast corner 600 feet southwest of the station at Carrboro. This area represents a dissected peneplain with early mature topography.

This area, as a whole, is a region of old igneous rocks of various colors, textures and age, belonging chiefly to the granite and granodiorite families. Acid dikes are common while diabase dikes are less common and largely confined to the northeastern part of the quadrangle.

The southeastern half of the Burhenglen quadrangle is the area for special study for this thesis. Its chief characteristics are briefly as follows:

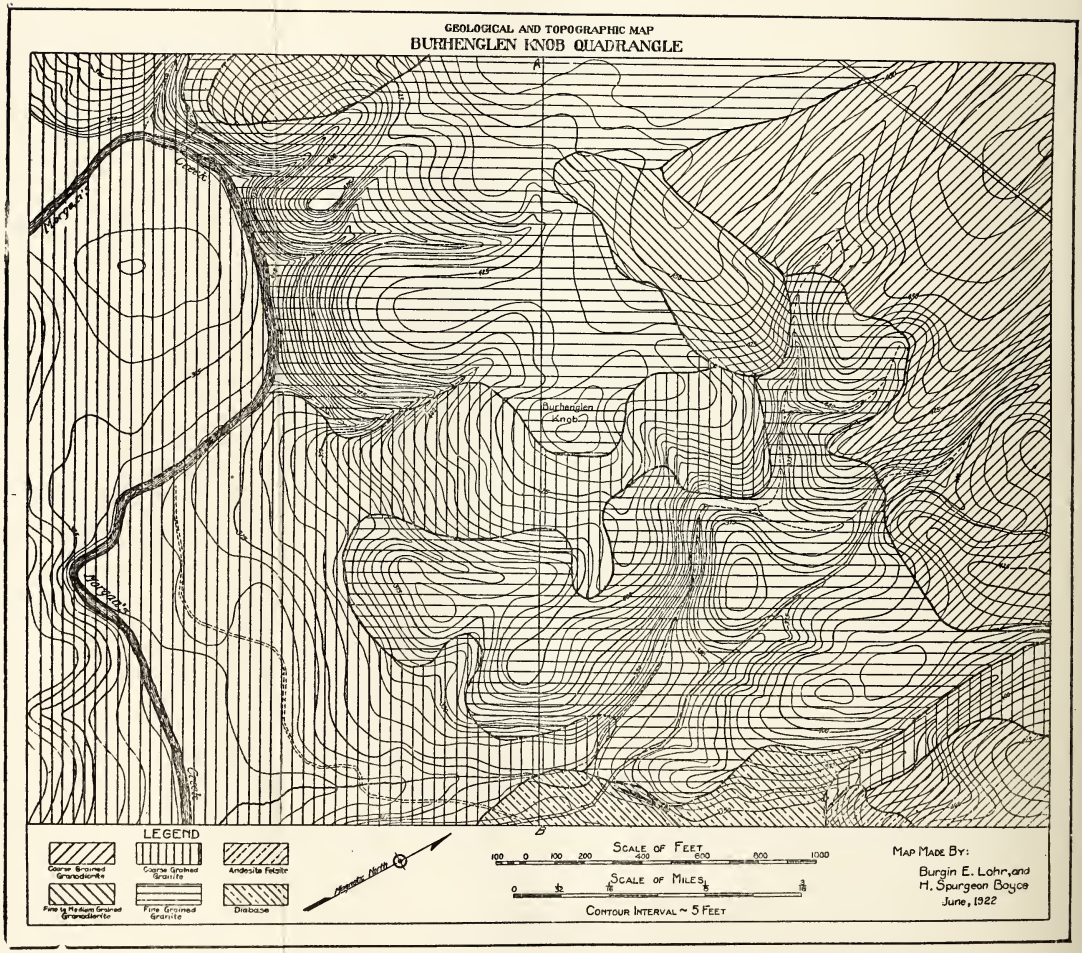
Soils—There are two types of residual soils, the Cecil sandy loam and the Georgeville silt loam. The former is of coarser texture and is confined to the area north of the creek, while the latter is finer and occurs largely south of the creek. Along the creek bottom occurs the alluvial Congare silt loam.

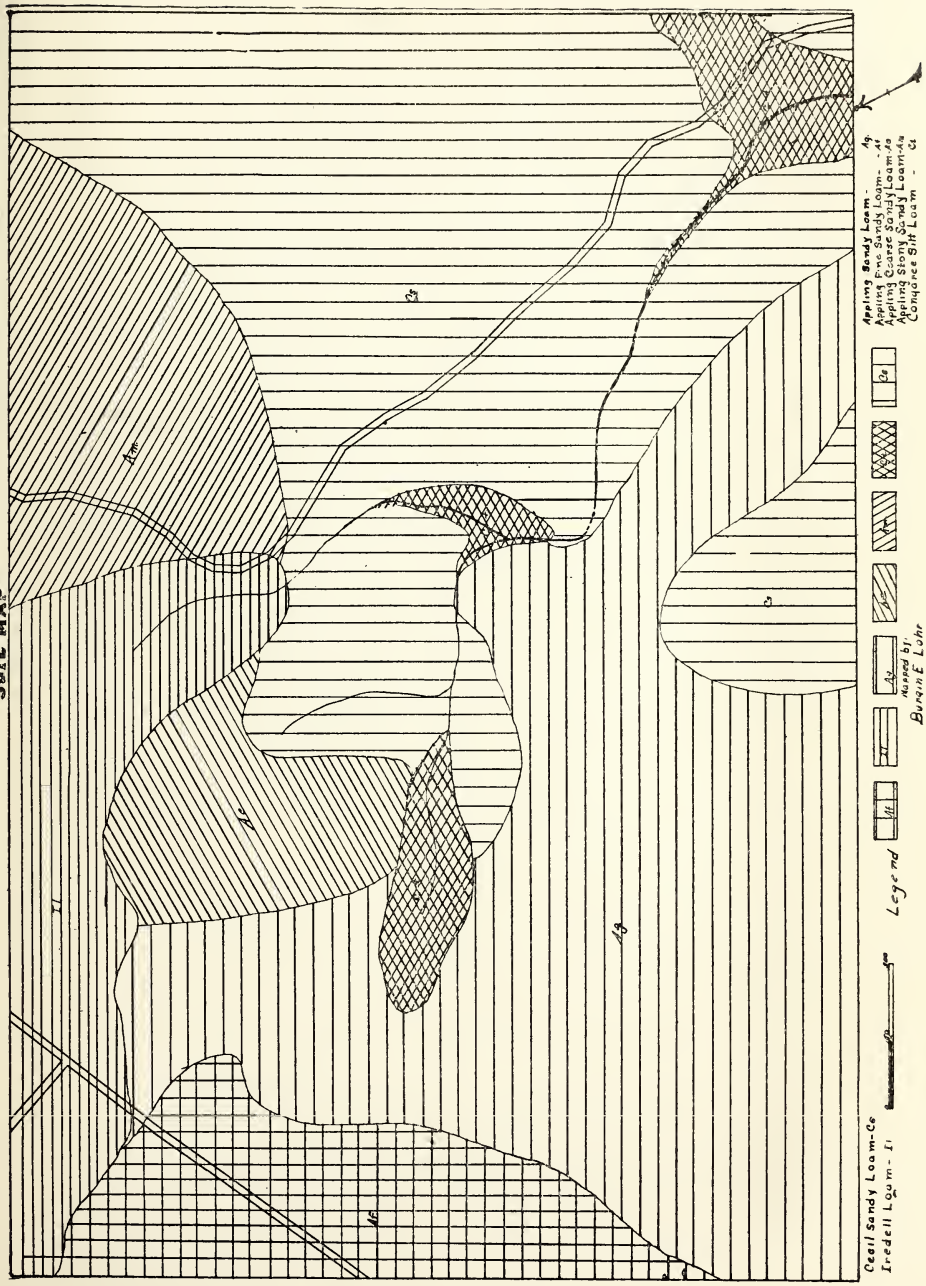
Petrography—Probably nine-tenths of the area under discussion is made up of granite, showing a high degree of variation in texture. For the most part the granites are coarse grained. These are cut by younger and finer-grained granites which are more resistant to weathering. From surface indications along this latter type of rock appears to predominate. The masses of fine-grained granite and aplites, which form the bluffs north of Morgan's Creek, appear to be high in silica. In many places the older course-grained granites of "Chapel Hill Mass" type are included in the finer grained acid intrusions and at one locality a considerable mass of schist occurs in the finer acid rock. This, according to the view of Dr. W. F. Prouty, is a mass of included Purefoy slate which has been silicified and mineralized by the same agencies which formed the quartz veins.

In the northwestern portion of the area of special study the fine-grained granite seems to grade into the granodiorite. In the northeastern part of the area occurs a dike of true diabasic character better exposed in the area of special study by Mr. B. E. Lohr. This dike material is identical with that of dikes cutting the Triassic strata in adjoining areas.

The numerous igneous rock types, the slickensides, intrusions and inclusions, shows they are to be one of great age and complex geological history.

Age—The coarse-grained granites are the oldest igneous rocks in the area (probably Proterozoic) while the diabase, of Posty Triassic age, is the youngest.




SOIL MAP
Legend
Appling Sandy Loam - Ag
Appling Fine Sandy Loam - At
Appling Coarse Sandy Loam - As
Appling Stony Sandy Loam - Am
Congaree Silt Loam - Cs
Cecil Sandy Loam - Cs
Iredell Loam - Il
Mapped by
Burgin E Lohr

The Geology and Soils of the Burhenglen Knob Quadrangle. By Burgin Edison Lohr.

The Burhenglen Knob Quadrangle is a rectangular- shaped area, 1¼ miles due west of Chapel Hill, N. C., and embraces a scope of territory of about ⅜ of a square mile. It is easily accessible from both Carrboro and Chapel Hill, the former of which lies just a few hundred feet to the north.

Morgan's Creek, which traverses the southern end of the quadrangle, and whose tributaries have deeply etched the old peneplain, furnishes ample drainage. The rejuvenation of the area has most probably been the cause for the deeply etched and rolling condition of the topography. Seldom does one find an area more rolling or better drained than the Burhenglen Knob Quadrangle.

The soils are chiefly of the standy loam type, most of which belongs to the Cecil and Appling series. Some Iredell loam is in the northern portion, and a few patches of Congaree silt loam is found along the streams. In the main, the soils are residual from the underlying igneous rock, and have either a red or a yellow subsoil, which is reached on an average at about 5 or 6 inches from the surface.

Lithologically, the area is well represented in spite of the fact that the rocks belong to just one general class. The granodiorite, which is a cross between granite and diorite, dominates the northern portion of the area of special study, and has a variation of texture from a medium fine to a course. Granite, which varies even more in textural differences, is the main rock of the southern part of the area. The diabase, which costitutes the only basic dike, possesses a small scope of the southern corner of the area and joins the small patch of andesite-felsite to the north. Feldspar, quartz, hornblende, and augite are some of the commoner minerals of the rocks indigenous to this territory.

From all available evidences, the ages of the rocks are not the same. Since the aplitic granite cuts the coarse-grained material in a network of dikes, and since the diabase cuts both of them, it is natural and reasonable to believe that coarse-grained granite is the oldest, the aplitic or a fine-grained granite next, and that the diabase is the youngest. From comparative evidences, the latter is most probably of Post-Triassic age.

From the evidences of faulting, there must have been considerable disturbances after solidification of the magma. Unfortunately, the origin of these disturbances is yet to be proved, but in all probability they were caused by volcanic or simple magmatic intrusive activity.

DEPARTMENT OF HISTORY

J. G. de Roulhac Hamilton is engaged in editing for publication through the North Carolina Historical Commission the diary and other autobiographical material of Randolph Shotwell (1842-1885), who was a prominent figure in North Carolina during the period of Reconstruction. The papers throw much light on political conditions of the time, and are particularly valuable for their information as to the operations of the Ku Klux in western North Carolina, and to the methods of the Federal officials in seeking to repress the secret organizations. In collaboration with Professor Edgar W. Knight, of the Department of Education, he has completed an investigation of the problem of training for citizenship which was published in June by A. C. McClurg and Company as a volume of the National Social Science Series under the title, "The Making of Citizens." He is also engaged in the collection of material for a study of the negro members of the United States Congress.

W. W. Pierson, Jr., has in press a monograph on "Some Reflections on the Cabildo as an Institution." This is a study in political theory. It will be followed by two other articles on the Hispanic-American Cabildo, thus constituting a series which on completion will be published as a volume.

R. D. W. Connor is at work on a life of Zebulon Baird Vance.

The following theses were submitted in June, 1922, for the degree of Master of Arts in the Department of History:

The Political Theories of John C. Calhoun. By C. R. Edney.

John C. Calhoun's political theories included all the practical and theoretical political problems—tariff, war, nationalism, finance, imperialism, slavery, nullification, and secession—that presented themselves during his political career. It is not the purpose of this discussion, however, to deal with any of his doctrines, except those formulated in regard to slavery, the origin of the State, Constitutional government, sovereignty, and the nature of the Union.

The principal material used in selecting data was *Calhoun's Works*, edited by Cralle; the *Correspondence*, edited by Jameson; and the biographies by Von Holtz.

Calhoun ridiculed the phrase "all men are born free and equal." He held that freedom and liberty were not for all, but for those only who by mental and moral development had won it and proved themselves deserving of it. Inequality of men was the true basis of free institutions. Liberty thrust upon people incapable of appreciating it was inexpedient and wrong.

He repudiated the doctrine of a pre-civil state of nature and the compact theory as the basis of the state. Of all states the pre-civil state was the most abhorrent to man's nature. Man is social by nature. In every age and every clime he has been found in the social state. Indeed, in no other state could he exist. The state grows out of the very nature of mankind. In a state, government is necessary to restrain individuals. Never was there a people without some form of government. But evil inheres in government itself. Therefore, man constructs a constitution to restrain government. A constitution regards "the sense of the community by its parts," and provides each interest or section with power of concurring with or negating the acts it believes unconstitutional that are passed by the general government. The power of acting is the government, the power of arresting action is the constitution. "The two combined make constitutional government."

The United States is a union of sovereign states bound together by a constitutional compact. The United States is a creature of the States. It exercises delegated powers only. Sovereignty is indivisible, therefore, the states that were originally sovereign, and have not yet surrendered their sovereignty, may, if the central government oversteps its authority, assert their sovereign rights and nullify its acts or withdraw from the Union.

The Presidential Campaign and Election of 1832. By Fletcher Melvin Green.

The period of Andrew Jackson is important to the student of American History, because new and broader interpretation of democracy came to be accepted. Jackson so typifies this movement that it took the name of Jacksonian Democracy.

There were two forces back of the movement. These were the rise of Western ideals and the growth of the laboring and industrial

class in the East. Frontier life developed independence and a sense of equality. This was diametrically opposed to the idea of an aristocratic ruling class. Likewise the laborer of the eastern cities found that his interests were not the same as those of the capitalistic class. Thus the westerner and the eastern laborer were led to unite their strength in opposition to the existing order and to demand for themselves a share in the exercise of political power.

This movement was not new to the campaign of 1832. It was but the continuation of the democratic spirit that had overthrown "King Caucus" in 1828. But it attained its great victory in 1832. Jackson was preëminently fitted to lead the movement. The people demanded one of themselves as leader. Jackson was all that and more. He thought and felt with the masses. In addition his personality was such as to make him a leader in any group. In the election of 1832 we see the influence of this class consciousness. Almost instinctively the poor, the ignorant and simple rallied to the support of Jackson; while the rich, cultured and respected opposed him.

In the election of 1832 we see the play of many forces. Besides the class struggle, Jackson's forceful foreign policy as exemplified in the French Spoiliation Claims, his seeming favorable attitude toward State Rights in the case of the Georgia Indians, his adherence to the free-land policy of the West, his stand on internal improvements, his plea for tariff revision and governmental reform, the strengthening of the party by firm adherence to the Spoils System, his determined opposition to the United States Bank, the tendency toward centralization in government, and executive opposition to South Carolina Nullification, all entered into the decision. Most of these reacted favorably to Jackson as shown by his victory.

The campaign of 1832 brought new developments to party politics. Party lines were more definitely drawn. The Adams and Clay groups were united as National Republicans with distinct policies and principles. Likewise the Crawford, Calhoun and Jackson men became Democratic Republicans with principles different from those of the National Republicans. We have too a Third Party, the Anti-Masons, opposing secret societies, especially the Masons. This latter party gave to us in this campaign the National Convention for nominating presidential candidates. The National Republicans contributed the party platform.

The election of 1832 brought a new significance to the presidency. Jackson regarded himself as the direct representative of the people and asserted the rights of the executive as they had never been asserted before. It brought too a tendency toward centralization of power in the hands of the central government. The determined resistance of Jackson to Nullification developed more fully the national-

istic spirit and idea expressed by Webster. It is in these seemingly opposing tendencies, wider democracy and centralization and nationalization, that the importance of the election of 1832 is to be found.

In the preparation of this paper the writer was limited by the lack of source material. The biographies of Jackson, Clay and Wirt, the standard histories of the period, and other secondary sources were used. The original sources to which access was had are Van Buren's *Autobiography*, *The Annals of Congress*, Webster and Calhoun's *Correspondence*, Tarboro (N C.), *Free Press*, *National Intelligencer*, and *Niles Register*.

Notes on Taxation in North Carolina, With Special Emphasis on the General Property Tax. By Tyre Crumpler Taylor.

Closely interwoven with the social and political structure of the State have been its financial policies. In matters of taxation the Constitution of '76 made no break with tradition. The policy of meager revenues and expenditures limited to the barest necessities was carried over from colonial to state government. But the transition required that some of the old sources of revenue, notably import and export duties, should be abandoned. The policy of the State as favoring an *ad valorem* basis for the levying of taxes became fixed as early as 1777. In general we may say that the revenue of the State in the period from 1776 to 1850 was derived from three main sources: (1) Taxation; (2) Dividends from Bank Stock; (3) The sale of public lands. The Revolution was financed chiefly by issues of paper money, loans, and specific taxes. Slaves were virtually untaxed—the basis of taxation for this species of property being the poll rather than *ad valorem* basis. Till 1850 the poll tax was the most stable as well as the most lucrative source of the State's income.

The period from 1800 to the Constitutional Convention of 1835 is the dreariest and most disheartening in the history of the State—unless that of reconstruction following the civil war be excepted. It was a period in which Eastern privilege dictated the policies of the state with the result that public education, internal improvements, and public works suffered. The sole aim of every legislature was to keep down the rate of taxation and serve the interests of the slaveocracy which elected them. In this period North Carolina became as the "Rip van Winkle of the States," and was described as "a valley of despair between two mountains of conceit." Not until 1850 was the taxation of personal property begun. From now on the poll

tax is of diminishing and the property tax of increasing importance. The rate on all kinds of property has steadily increased. Likewise, an increase in the kinds of taxable property has accompanied this increase in rates.

In the Constitution of 1868 the General Property Tax was firmly imbedded as the basis of our revenue system. "Laws shall be passed taxing, by a uniform rule, all moneys, credits, investments in bonds, stocks, joint-stock companies, or otherwise; and, also, all real and personal property, according to its true value in money." (See Art. V—Const. N. C.) The Constitution also provides that the poll tax shall always be equal to the tax on $300 worth of property—an equation of limitation designed to prevent the confiscation of property by numbers and the oppression of numbers by property. From the time of its adoption until the most recent years the general property tax has turned into the treasury more than two-thirds of the total amount of revenue raised for State purposes.

The system of assessment provided for in the various "machinery acts" is that known as the "listing system." Every owner of property has been compelled to appear before the list-takers and give a list of his property. In 1901 the Corporation Commission was created, also the State Tax Commission with this general power among others: To exercise general supervision over tax listers and assessing officers. The advent of Aycock marks the end of an old, and the beginning of a new era in our taxation history. Vital economic and social needs—notably education—were pressing for recognition and this inevitably meant increased revenue and taxation. In 1919—partially as a result of recommendations of certain committees which had been appointed to investigate the situation—the Revaluation Law, designed "to make the tax books tell the truth," was adopted by the Legislature. Many millions of dollars worth of property thus became subject to the taxing power of the State, which before had been exempt, but for a number of reasons revaluation largely failed. One of the first acts of the Morrison administration was a horizontal reduction of valuations and the shifting once more of the center of gravity in the system of assessing from the Tax Commission at Raleigh to the County Commissioners at the various county seats. In 1920 the General Property Tax for State purposes was finally abandoned altogether, the State depending for the greater part of its revenue on an income tax. This left the taxation of property in the hands of the localities and admitted,

finally, that the General Property Tax is a very unsatisfactory method of raising revenue. The principal reasons for its failure were listed under three main heads:

(1) Lack of uniformity.

(2) Lack of universality.

(3) Incentive to dishonesty.

Chief sources: Public Laws of N. C., 1776-1921. The Treasurer's and Auditor's Reports, Greensboro *Daily News* (1914-21).

The Limitation of Armaments: An Historical Study. By Miles Hoffman Wolff.

The purpose of this essay is to treat historically the movements toward a limitation of armaments. The treatment of the subject is confined to those proposals which had governmental backing. Private proposals are omitted because of the fact that they have contributed but little toward the general movement.

The principal works used were Wehberg, *The Limitation of Armaments;* Callahan, *The Neutrality of the American Lakes;* Scott, *The Hague Peace Conference of 1899 and 1907;* Schmidt, *England and Germany; The Peace Treaty with Germany;* and contemporary newspapers and periodicals.

The subject was divided into two parts, agreements affecting a limited area and agreements affecting a wide area. Under the first was included the Rush-Bagot agreement, and the Chile-Argentine arrangement. Agreements affecting a wide area included the two Hague Conferences, The Anglo-German Negotiations preceding 1914, the disarmament of Germany, the work of the League of Nations toward disarmament and the Washington Conference for the Limitation of Armaments.

An attempt has been made to connect these various proposals and show the progress made toward disarmament. It has been shown that this is especially true of the agreements affecting a wide area. They indicate and present hopeful possibilities for the future.

DEPARTMENT OF LATIN

G. A. Harrer has published the following articles:

Precedent in Roman Law. *Studies in Philology,* XIX, 1. January, 1922.

The paper attempts to show that precedents were not set by judge's decisions in actual trials, but rather by jurist's interpretations of the law, generally collected and published in book form.

The Profession of Law in Rome. *The Classical Journal,* XVII, 6. March, 1922.

This paper is descriptive of the position and significance of the legal profession in ancient Rome, particularly in the period of the Empire.

Wells on Roman History. A paper read at the annual meeting, at Atlanta, of the Southern Section of the Classical Association of the Middle West and South, April 27, 1922.

This paper is an estimate of the character and value of the part of Wells's *Outline of History* which deals with Roman civilization.

The Study of Greek and Latin Papyri. A paper read at a meeting of the Philological Club in April, 1922.

DEPARTMENT OF LAW

A. C. McIntosh. Changes in North Carolina Procedure. *North Carolina Law Review,* I, 1. June, 1922.

The Code of Civil Procedure, adopted soon after the changes in the North Carolina Constitution in 1868, has continued comparatively free from change for fifty years, but within the last three years several statutes have been enacted which have changed the former practice materially. The article discusses these statutes and their effects upon the practice in North Carolina.

M. T. VAN HECKE has edited *The North Carolina Law Review,* concerning which a statement appears elsewhere in this bulletin; has contributed a note to the *West Virginia Law Quarterly* for November, 1921, on *The Assignability of an Option Contract,* and is now engaged on the following papers, to be published in the *Illinois Law Quarterly* and *The North Carolina Law Review,* in the fall: *The Peabody v. Russel Cases, Criminal Penalties in Illinois, The Nature of Legislative Power in North Carolina,* and *Special, Private, and Local Legislation in North Carolina.*

DEPARTMENT OF MATHEMATICS

ARCHIBALD HENDERSON is prosecuting researches in the theories put forward by Albert Einstein under the names of Restricted and Generalized Relativity. During the autumn of 1921 he conducted a research seminar dealing with the mathematical aspect of Relativity, and disengaged a number of subjects for research, which were taken up by various members of the mathematical staff. He published three papers, purporting to elucidate the subject of Relativity, in the Greensboro *Daily News* (Oct. 23 and 30, Nov. 6, 1921) under the title "Relativity: a Romance of Science." For some time he has had in preparation a bulletin for the Extension Series which will deal with the subject of Relativity in an elementary way, using but little mathematics in order to make the subject intelligible to anyone who has only a moderate knowledge of mathematical technic.

A more comprehensive work, which is interesting as a contribution on the part of the entire mathematical staff, is a volume of studies dealing with various aspects of the subject of Relativity, both of the Restricted and the Generalized types. This volume will be the first volume of a series of scientific monographs, issued from time to time by members of the staff of the Department. Mr. Henderson will edit the volume and contribute two essays dealing with the fundamental aspects of the Restricted and the Generalized theories, and setting forth in detail the mathematical explanations of the three crucial tests suggested by Einstein him-

self. Other phases of the subject will be handled by other members of the mathematical department, as appears below in connection with their names.

In addition to the above, Mr. Henderson has published the following papers and monographs:

The Teaching of Geometry. *Extension Series No. 39.* October 1, 1920.

In this publication of forty-nine pages, a scientific and detailed study is made of the various methods and avenues of approach to the study of geometry from the standpoint of the research worker. These are catalogued and fully explained by illustrative examples. The monograph is fully illustrated with figures in the text, and was designed particularly for those studying and teaching geometry scientifically.

Number; and the Fundamental Laws of Algebra. *Educational Monograph* issued by the School of Education.

In this monograph, which originally appeared in the *High School Journal*, March, April and December, 1921, Mr. Henderson explains the difficulties which lie at the foundations of mathematics with reference to number and the fundamental laws of algebra.

In conjunction with H. G. Baity: An Interesting Maximal Case. *Journal Elisha Mitchell Scientific Society,* XXXVII.

The problem, to inscribe a maximum rectangle in an ellipse, is quite familiar; but the particular technic employed brings out the singular features of the problem. The ordinary methods of handling the problem are given in full, in addition to the very brief method which characterizes this paper. The introduction of an auxiliary curve in the course of the investigation constitutes a special feature of this paper.

A. W. HOBBS: During the present year, Mr. Hobbs has been investigating the derivation of the most general form of the Lorentz Transformation without the use of vector analysis. In the forthcoming volume of studies—Relativity, he will include the result of his investigations, as well as a historical study of the basic

experiments upon which Restricted Relativity rests. He is also engaged in an investigation of the following problem in ballistics:

The Projectile Problem under the Inverse Square Law.

If a particle be projected at an angle and with velocity v under the inverse square law of attraction the equations of motion are

$$\frac{d^2x}{dt^2} = -\mu \frac{x}{\gamma^2}$$

$$\frac{d^2y}{dt^2} = -\mu \frac{y}{\gamma^3}$$

A first integration gives

$$x\frac{dy}{dt} - \gamma \frac{dx}{dt} = h$$

or

$$\gamma^2 \frac{d\theta}{dt} = h \text{ and } v = \frac{h}{p}$$

also

$$\frac{d^2x}{dt^2} = -\frac{\mu}{h}\frac{d\theta}{dt} \cos\theta$$

$$\frac{d^2y}{dt^2} = -\frac{\mu}{h}\frac{d\theta}{dt} \sin\theta$$

$$\frac{dx}{dt} = -\frac{\mu}{h} \sin\theta + \mathrm{A}$$

$$\frac{dy}{dt} = \frac{\mu}{h} \cos\theta + \mathrm{B}$$

or

$$\frac{dx}{dt}\ v \cos a \qquad \mathrm{A} = \frac{\mu}{h} \sin a + v \cos a$$

$$\frac{dy}{dt}\ v \sin a \qquad \mathrm{B} = \frac{\mu}{h} \cos a + v \sin a$$

Using these values of $\frac{dx}{dt}\ \frac{dy}{dt}$ A and B $in \times \frac{dy}{dt} - y\frac{dx}{dt} = h$ we get

$$\frac{\mu}{h}\gamma + \mathrm{B}x - \mathrm{A}y - h = 0$$

When

$$\frac{\mu}{v_0\ \gamma_0 \sin a}\sqrt{x^2 \times y^2} + x\left(v_0 \sin a - \frac{\mu \cos a}{v_0\ \gamma_0 \sin a}\right)$$
$$- y\left(\frac{\mu \sin a}{v_0\ \gamma_0 \sin a} + v_0 \cos a\right) - v_0\ \gamma_0 \sin a = 0$$

We now consider a as variable and put ton $a = \frac{dy}{dx}$. This leads to a differential equation of the second degree for which a practicable solu-

tion is sought. The differential equation itself gives the two directions for firing a projectile from any point in the plane so as to pass through the point x_0, y_0.

J. W. LASLEY. In connection with the work of the department in the field of Relativity, Mr. Lasley has undertaken a study of the subject of curvature. It is the object of this work to make available the formulas for Gaussian and Riemannian curvature, the Einstein curvature tensor, the criteria for determining curvature of surfaces, typical forms for the lineal element, the Schwartschild, de Sitter, Riemann normal form, etc., spaces of constant curvature. These matters are to be developed systematically with examples, in the effort to make smoother the way for the student who wishes to become equipped with this phase of the mathematical machinery with which Einstein did his work.

Mr. Lasley reported to the North Carolina Academy of Science on some work on which he is engaged in connection with coördinate systems in mathematics. Since the time of Descartes mathematicians have been equipped with the means of attacking geometric problems by analytic methods. The question has continually arisen as to what system of coördinates is best suited to particular types of problems. An attempt to answer this question has led to many kinds of coördinate systems. One of these, homogeneous coördinates, besides being one of the most powerful includes many of them as special cases. A detailed and connected account of this system of coördinates is a need that is keenly felt by students of mathematics. The work now underway purports to meet this need.

A. S. WINSOR is at work upon certain problems in the field of Relativity. This investigation is included under the following heads:

(*a*) A general exposition of the General Theory of Relativity, leading up to the conclusion that the world is non-Euclidean and four-dimensional.

(*b*) The conclusion that the world must be Spherical or Elliptical from the properties of these two kinds of space.

(*c*) An examination of the linear element in Elliptical and Spherical space from the Relativity point of view. Some general conclusions regarding the Density, Matter and Finiteness of the Universe.

(*d*) Resumé of Einstein's argument for the computation of the volume of the Universe.

J. B. LINKER. During the past year, Mr. Linker has been making a study of Riemann's work as related to Einstein's theories. On June 10, 1854, Riemann read before the Philosophical Faculty at Göttingen his *Probevorlesung*: *Ueber die Hypothesen, welche der Geometrie zugrunde liegen.* This paper, which was very cryptic and announced a number of important scientific results, contained almost no mathematical symbols and was long neglected by mathematicians. This paper contains the fundamental material for the erection of the structure of the Generalized Relativity Theory. In addition to translating this paper into English, Mr. Linker is engaged in deriving certain of the results which Riemann states without proof. The paper in its entirety, in an English translation, with explanatory notes and appendix, will be published.

E. L. MACKIE. During the past year, Mr. Mackie has been making a special study of the theories of Helmholtz, which are closely related to the theories of Reimann regarding n-way spreads and hyperspace. He has translated Helmholtz's notable papers: *Ueber die thatsachichen Grundagen der Geometrie* and *Ueber die Thatsachen, die der Geometrie zum Grunde liegen.* These papers are directly connected, historically, with the evolution of Einstein's ideas regarding the nature of space, of the connection between geometry and mechanics. Mr. Mackie is prosecuting his studies in this direction, particularly in relation to Poincaré's analysis and investigation of the various kinds of geometries.

The following thesis for the degree of Master of Arts in the Department of Mathematics was presented in June, 1922:

Eugenio Beltrami's contribution to the Theory of Surfaces. By M. A. Hill.

The purpose of this research is to link together the contributions of Riemann and Beltrami on the theory of surfaces, and to see upon what foundation Einstein has built his Relativity Theory.

Among the many memoirs of Beltrami along this line the one entitled "Fundamental Theory of Surfaces of Constant Curvature," is the most important. In this essay we see how the geodesic lines may be represented by linear equations, and how the nature of the curvature of the surface may be determined by direct comparison with Riemann's formula for the length of the arc. This formula as given by him is:

$$ds^2 = \frac{\Sigma dx^2}{\left[1 + \frac{a}{4}\Sigma x^2\right]^2}$$

where a is the measure of curvature. An example is taken, and it is shown by what transformations and substitutions a surface is reduced to the above form.

DEPARTMENT OF PHARMACOLOGY

WILLIAM DEB. MACNIDER published the following articles:

Concerning the Type of Injury to Renal Epithelial Cells which Increase the Susceptibility of the Cell to the Action of the General Anesthetics. *Boston Medical and Surgical Journal.* Vol. 186, 350, 1922.

From observations which have been made in this study concerning the stainable lipoid content of renal epithelial cells, the Meyer-Overton law would appear to apply to cells in this location as well as in the central nervous system. The investigation points out that, following the accumulation of lipoid in the renal epithelium, these cells take up more of the anesthetic substance than do normal cells, and as a result of more of the anesthetic entering the cells, degenerative changes develop which impair or suspend the function of the cells.

Concerning the amount and distribution of stainable lipoid material in renal epithelium in normal and acutely nephropathic animals, with observations on the functional response of the kidney.

Proc. Soc. for Ep. Biol. and Med. Vol 19, 222, 1922.

Lipoid material stainable with Scharloch R. is constantly found in the cells of the loops of Henle in normal dogs. The presence of such material in this location is not indicative of a pathological kidney. The functional capacity of such a kidney is normal.

When animals are given one subcutaneous injection of 6 mg. of uranium nitrate per kilogram, the earliest evidence of injury to the kidney consists of an increase in the amount of stainable lipoid in the cells of the loops of Henle. At this stage of the intoxication there is no evidence of a functional disturbance on the part of the kidney and no change takes place in the acid-base equilibrium of the blood.

At a later stage of such an intoxication (12 hours) stainable lipoid material appears in the convoluted tubule epithelium. The vascular tissue of the kidney is uninjured. Associated with such a disturbance in the metabolism of these cells that leads to the appearance of stainable lipoid in the cell there occurs a reduction in the elimination of phenolsulphonephthalein, a depletion in the alkali reserve of the blood and the appearance of albumin and glucose, or glucose alone in the urine.

Following this initial injury to the tubular epithelium, changes of a more distinctly degenerative type appear in these cells, and the functional capacity of the kidney is more severely impaired.

A Study of the Anurias Occuring in Normal Animals During a Period of Anesthesia by Ether and Chloroform. *American Journal of Surgery.* April, 1922.

The investigation has shown that normal dogs with urine free from albumin and casts and with a normal elimination of phenolsulphonephthalein may, following an anesthetic become acutely anuric. The anurias have been associated with either a low carotid blood pressure, a marked disturbance in the acid-base equilibrium of the blood, or both conditions may exist in the same animal.

If the anuria is due to the low systemic blood pressure, it can be relieved by various diuretic solutions. If, on the other hand, it is associated with a marked disturbance in the acid-base equilibrium of the blood, such diuretic solutions are of no value in inducing a flow of urine. The above observations would indicate that in the preparation of a patient for a general anesthetic, the diet should be of such quantity and quality as to prevent the development of an acid intoxication. The occurrence of such a condition can furthermore be guarded against by the judicious use of sodium bicarbonate.

Naturally Nephropathic Animals. On the ability of an alkaline solution to influence the amount of stainable lipoid material that appears in the kidney following the use of a general anesthetic. *Jour. Pharm. and Exp. Therapeutics.* (In press for publication.)

The use of a solution of sodium carbonate in naturally nephropathic animals causes an increase in the reserve alkali of the blood which may be maintained in an unanestheized animal over a period of two hours at a point above the normal alkali reserve determination for the animal.

A study of kidney tissue from such animals stained for lipoid material with Scharloch R. by Herxhimer's method shows an absence of such material in the cells of the loops of Henle and in the convoluted tubule epithelium. Naturally nephropathic animals that have served as control experiments for these animals and have received intravenously a solution of sodium chloride equimolecular with the sodium carbonate solution have shown stainable lipoid material not only in the cells of the loops of Henle but also in the convoluted tubule epithelium. The deduction is made that the use of a solution of sodium carbonate in naturally nephropathic animals either so changes the character of the stainable lipoid material normally present in these cells so that it fails to stain with Scharloch R., or that the solution causes the disappearance of such material from these cells.

When naturally nephropathic animals are given a solution of sodium chloride and then anesthetized with ether for a two-hour period, the animals are found to be unable to maintain during the anesthetic a normal alkali reserve of the blood. There occurs a reduction in the alkali reserve of the blood and urine formation is reduced or the animals become anuric.

When naturally nephropathic animals are given intravenously a solution of sodium carbonate and then anesthetized with ether for a two-hour period, it has been found that ten of the twelve animals which have been subjected to such a technique have maintained during the course of the anesthesia a blood which has failed to show a depletion in the alkali reserve below the normal. The kidneys of such animals have failed to show the presence of stainable lipoid material in the cells of the loops of Henle, or in the convoluted tubule epithelium. The animals have remained freely diuretic and responsive to a diuretic substance, theobromine, that is supposed to exert its diuretic effect through stimulating the epithelial mechanism in the kidney.

Two of the twelve animals that received intravenously a solution of sodium carbonate and were then anesthetized were unable to maintain during the period of anesthesia a normal acid-base equilibrium of the

blood. The blood showed a depletion in the alkali reserve below the point established as a normal by the naturally nephropathic animals. Kidney tissue from these animals has shown lipoid material stainable with Scharloch R. in the cells of the loops of Henle and in the convoluted tubule epithelium. Such animals were less diuretic than were animals in which stainable lipoid material could not be demonstrated in renal epithelium. The kidneys of these animals either failed to respond to the diuretic effect of theobromine, or the response was slight in comparison with that obtained in the other animals of the group.

The above experiments not only show the ability of a solution of sodium carbonate to influence the amount of stainable lipoid material in the renal epithelium, but they also indicate a relationship between the amount of stainable lipoid material in the renal epithelium and the toxicity of the anesthetic for the kidney.

DEPARTMENT OF PHYSICS

A. H. PATTERSON is continuing his investigations on the destructional causes of lightning and lightning protection.

OTTO STUHLMAN, JR. The Variation of the Photoëlectric Current with Thickness of Metal. Read at the Meeting of the Physical Society, Washington, April, 1922. *Physical Review,* July, 1922.

Silver and platinum deposited in the form of transparent and semi-transparent wedges were examined for variation of the photoëlectric current as thickness of the metal was increased. The metal was deposited on quartz by the evaporation method and examined when monochromatic light fell on the metal side of the plate.

The results are found to be consistent with the view that the probability of an electron going a given distance without losing its ability to escape falls off exponentially with the distance, when this distance is less than about $40\mu\mu$. Up to this thickness there is a parallelism between optical absorption and photoëlectric emission. For large wave-lengths this parallelism is more pronounced than for short wave-lengths. For greater wave-lengths optical absorption may increase but photoelectric emission decreases terminating at the threshold value of photoelectric sensitivity.

The results seem to support the view that photoëlectric emission is probably not caused by the absorption of energy out of the incident light beam, the light only acting as the agent which sets the electron free from its parent atom.

The Color of Thin Films of Gold and Silver by Transmission. Read at the Meeting of the North Carolina Academy of Science, May, 1922.

Semi-transparent films of gold are red by transmission when pure gold is used in contradiction to the color attributed to pure gold as found in gold leaf, namely green by transmission. The color of gold leaf is green when copper is used, in the beating of the leaf, to make it malleable. The color may be blue-grey when silver is used for the same purpose.

The color of silver by transmission may vary from blue-black to red as the thickness increases from that of molecular films to the semi-transparent variety. Thicker, nearly opaque, films are blue with an absorption band as yet not definitely determined.

D. A. Wells and Otto Stuhlman, Jr. A method of using the Audion as a Source of Negative Resistance. (Ready for publication.)

To develop a negative resistance in any circuit we must have an arrangement in which with an increase in voltage we get a decrease in current. The circuit developed here is a modified Dynatron circuit in which an ordinary U-V Radiatron amplifying tube is inserted. The secondary electron current developed by the thermionic bombardment, is used to develop the negative resistance.

Otto Stuhlman, Jr. On Secondary Electron Emission. (In Progress.)

J. F. Daugherty and Otto Stuhlman, Jr. The Electrodeless Spark Spectrum of Zirconium. (Proposed Master's Thesis.)

DEPARTMENT OF PSYCHOLOGY

J. F. DASHIELL has been continuing his study of animal behavior with reference to the experimental analysis of the factors involved in maze construction. This year his special interest has been in the problem of the relation of number of blind alleys to total maze difficulty.

H. W. CRANE has been making critical studies of the correlations between individual and group intelligence examinations. This has been in coöperation with W. D. GLENN.

Publications:

"Reäctions of the White Rat to Multiple Stimuli in Temporal Orders," E. W. Atkins and J. F. Dashiell, *Journal of Comparative Psychology*, October, 1921, Vol. 1, 433-452. (For abstract, see *Research in Progress,* 1921.)

The following theses for the degree of Master of Arts in the Department of Psychology were presented in June, 1922:

Relative Reliability of Group and Individual Intelligence Tests. By William Darby Glenn, Jr.

Investigations were made to test the relative practicability of three of the widely used group methods of examination of mental level. The pupils in the Chapel Hill graded school, grades 3 to 8 inclusive, were divided into three groups, representative of all grades. At intervals of one month, in varying orders, to each of these groups were given the Myers, the National, and the Pintner Non-Language tests. Each subject was also given the individual Stanford Revision tests. On the basis of this data coëfficients of correlation were determined between the individual and each of the group examination methods.

Racial Differences Measured by the Downey Will-Temperament Test. By John Holman McFadden.

Psychological studies of racial differences have hitherto been made mostly on intelligence and on simple sensory and motor traits. In this research, volitional and temperamental traits were studied as

found in the white and negro races. About 40 subjects were used from each of the following student groups: white college, negro college, white high school, and negro high school.

It was found: In predominance of temperamental patterns, the whites slightly surpass the negroes in number of mobile, rapid-fire individuals; they have a clear superiority in the number of controlled, deliberate, careful persons; and they slightly surpass the negroes in the number of individuals showing a combination of these two characteristics. The negroes slightly surpass the whites in the number of aggressive persons and in the number of individuals combining quickness and mobility with aggressiveness, and also in the number combining aggressiveness with deliberation.

In "strength of personality," as indicated by the total score of each individual, the whites surpass the negroes, only 15.4% of the latter exceeding the median of the whites.

Some incidental findings were: There was little difference in group variabilty between the respective racial groups. The negroes of both college and high school tended to be from 2 to 3 years older than the white student of the same grade. Some changes in Will-Temperament scores with increase in age and increase in grade were also found.

DEPARTMENT OF ROMANCE LANGUAGES

William M. Dey presented a paper before the Philological Club April 4, 1922, on Rostand: *La dernière nuit de Don Juan,* being a part of a study of some recent developments of the Don Juan legend. In this paper, after giving an analysis of the play, he tried to show that Rostand borrowed hardly anything from his predecessors, except the essential elements and personages of the legend. If there is any one play which had more influence on Rostand than the others, that one is Molière's *Don Juan;* indeed, we feel distinctly the atmosphere of Molière's play. But the condemnation to the eternal flames of hell is too good for Don Juan; his end must be, not a terrible catastrophe, but a derision.

Mr. Dey is continuing his work in phonetics, and also his study of the *Poèmes philosophiques* of Alfred de Vigny.

STURGIS E. LEAVITT. Chilean Literature. A bibliography of literary criticism, biography and literary controversy. *Hispanic American Historical Review,* Vol. V, 115-43, February, 1922. (To be continued in succeeding numbers.)

Includes books, magazine articles and the publications of four of the leading newspaper critics of Chile.

Uruguayan Literature. A bibliography of literary criticism, biography and literary controversy. *Hispania,* Vol. V, Nos. 2 and 3, March and May, 1922.

The result of investigations in the *Biblioteca de Segunda Enseñanza* and the library of the University of Montevideo. A study of the books and magazines published in Uruguay dealing with the national literature, with mention of contributions by Argentine scholars.

Argentine Literature. A bibliography of literary criticism, biography and literary controversy.

(In preparation.)

A bibliography of Peruvian literature, 1821-1919. To appear in the *Romanic Review.*

A bibliography of Bolivian literature. To appear in the *Romanic Review.*

DEPARTMENT OF RURAL SOCIAL ECONOMICS

E. C. BRANSON AND S. H. HOBBS, JR., directed the usual collateral studies of particular North Carolina problems in economic, social and civic fields, some 92 in number in 1921-22 and more than 500 all told during the last eight years. Thirty-one of these were given in brief to the public in the weekly issues of the University *News Letter.*

Also they directed and edited the 1920-21 N. C. Club Year-Book on North Carolina, Industrial and Urban, a bulletin of 19 chapters and 185 pages. Five of the chapters were questionnaire researches: (1) The Mill and Factory Centers of North Carolina, (2) City Planning in North Carolina, (3) Municipal Finance and Financial Methods, (4) Municipal Utilities and Franchise Policies, and (5) Municipal Accounting; and one was a field study conducted in person—Gaston County Mill Towns.

Home and Farm Ownership (1) in North Carolina, (2) in other states and sections of the Union, (3) in other countries of the world, were the research studies of the North Carolina Club in 1921-22. The nineteen chapters are now being edited for publication in the early fall.

Four county bulletins: (1) Johnston County: Economic and Social, by G. Y. Ragsdale and W. M. Sanders, Jr.; (2) Buncombe County: Economic and Social, by A. M. Moser, F. J. Herron, J. C. Cheesborough and P. S. Randolph; (3) Caldwell County: Economic and Social, by H. C. Corpening, C. M. Andrews, F. A. Grissette, and F. L. Warren; and (4) Vance County: Economic and Social, by M. Y. Cooper, J. H. Zollicoffer, and L. A. Voorhees.

Standards of Living in Farm Tenant Homes is a field study that is now being made in Chatham County, by a graduate student, J. A. Dickey. The survey will consume the summer months. This study is being made by the Department of Rural Social Economics of the University for the State Department of Agriculture and in collaboration with the Bureau of Markets and Rural Organization of the U. S. Department of Agriculture.

Farm Tenancy and the Country Church, a thesis for an A.M. degree by J. M. Arnette, treats, (1) the effects of tenancy upon the country church, (2) farm tenancy and the ministerial supply, and (3) rural social economics courses in church schools and seminaries—these last two sections by correspondence questionnaires.

The Church and Landless Men, a bulletin by L. G. Wilson and others, Vol. 1, No. 2, 1922, of the University of North Carolina Extension Division.

DEPARTMENT OF SOCIOLOGY

HOWARD W. ODUM is, in continuation of his studies of the organization and administration of Public Welfare in the United States, editing the January volume of the *Annals of the American Academy of Polticial and Social Science.* The volume will be devoted to public welfare in the United States and will consist of seven parts and the reviews of books and literature. Part 1, Introductory; Part 2, The History and Principles of Public Welfare; Part 3, State and County Systems of Public Welfare in the United States; Part 4, City Systems of Public Welfare in the United States; Part 5, The Contributions of Voluntary Agencies and Organizations to Public Welfare; Part 6, Special Problems of Public Welfare; Part 7, Professional Training for Leadership and Social Work.

The Journal of Social Forces has been announced for the fall of 1922.

The *Journal* is edited through the School of Public Welfare, and the Department of Rural-Social Economics of the University, with the following editorial board: Howard W. Odum, Managing Editor; E. C. Branson, Dudley D. Carroll, Walton H. Hamilton, Jesse F. Steiner and Harold D. Meyer. The contributing editors are selected from the south, east, and west. In addition to the contributed articles, the first of which is by Professor Franklin H. Giddings, Professor of Sociology and History of Civilization at Columbia University, the *Journal* will have the following departmental contributions: Teaching and Research Work in the Social Sciences; Conference for Social Work; Inter-State Reports from the Fields of Public Welfare and Social Work; Inter-Racial Coöperation; National, State and Local Country Life Programs; Current Progress in Town and City Programs; The Church and Social Service, and the Work of Women's Organizations.

Mr. Odum is continuing the study of Educational Sociology, with special emphasis on the attempt to measure objectively institutional modes for the development of the social personality

and the social progress. He has published during the year "Attainable Standards in Municipal Programs," and is a member of the new editorial board of the *Inter-Weekly Independent.*

J. T. Steiner, as Chairman of the Citizens' Committee of One Hundred on Prison Study in North Carolina, is undertaking an extensive investigation into present prison conditions in the State. Mr. Wiley B. Sanders is making the field studies, and will have back of him the resources of the State Conference of Social Service. The investigation will cover twelve points, beginning with the inquiry into legal and judicial procedure, and ending in the investigation into the whole question of employment of discharged prisoners. Other subjects of inquiry include mental and physical examination of prisoners, the separate treatment of different classes of prisoners, the work of farm colonies for women offenders, present living conditions in road camps, the honor system in North Carolina prisons, the parole system, and institutional care of prisoners.

Mr. Steiner is continuing his studies of newer tendencies in community organization in the United States and abroad, and is including in his inquiries not only the progress being made in the technique of community organization, but also the principles involved in group psychology and behavior. Included in the search for facts will be a detailed study of present efforts toward formal community organization of the mill villages of North Carolina. He is publishing in the November *Journal of Social Forces* "Community Organization," a study of recent tendencies.

Harold D. Meyer is making a study of facilities for organized play and recreation in North Carolina. He is also making a survey of boy-work activities in the State in relation to juvenile delinquency in the South. Mr. Meyer has published during the year, through the Extension Division: The Rural Playground, and The Parent-Teacher Association, a manual for North Carolina.

The following work by advanced students is under way:

W. B. SANDERS is making a comprehensive study of the working of the juvenile courts law in North Carolina, and will extend his research into the whole problem of probation and juvenile delinquency. As executive secretary of the North Carolina State Conference, he is carrying out the research plans of the Citizens' Committee of One Hundred.

R. M. BROWN has almost completed his careful preliminary study of poor relief in North Carolina, including special investigations into the organization and administration of county homes and into the physical and mental status of persons receiving poor relief in the State.

The following thesis for the degree of Master of Arts was presented in June, 1922.

The Organization and Administration of Public Welfare in the United States. By James Allen Dickey.

The steadily increasing complex social, industrial and political conditions into which twentieth century life and twentieth century civilization are drifting, make popular government more complicated. Many states and cities are beginning to realize that there should be a conscious and organized effort to adjust individuals to their social surroundings and to modify conditions in such a way that an ever-increasing number of people should be able to enjoy physical, moral and mental healthfulness. This is evidenced by the fact that practically every state and city has in recent years developed organized departments of public welfare or departments of corresponding duties to foster the growth of social consciousness.

This thesis is an attempt to evaluate this public welfare movement. Particular attention has been paid to an historical and analytical study of the public welfare concept including the technique of public welfare as it is now carried on in different parts of the country. The need of such a study is evident from the fact that there is no present agreement as to the extent of governmental responsibility for the welfare of its citizens.

The study is divided into five parts; the first contains an historical narrative of the development of the public welfare concept, and its analogy to the development of public education, and democracy as a mode of government. Part two, dealing with the organization and administration of public welfare in the states, aims to point out the general tendencies in the states and cities, with a careful study of some of the older and newer systems, concluding with a complete statistical summary of all the state and city departments, giving the divisions of work. In part three the aim was the same as in part two, except that the study was made of the city systems. In part four an effort was made to summarize some of the urgent problems of the states and cities with an analysis of the methods employed by them in handling these problems. An appraisal of the problem of poverty and dependency with an abstract of the legal settlement and pauper laws of every state in the Union determining the care and control of the poverty and dependency class and the administration of the charitable, curative, reformatory and penal institutions, was made to determine the uniformity in the existing laws, and the provision for the care and control of the poverty-stricken and dependent class. Finally, part five is devoted to a study and determination of the value of the contribution of voluntary agencies to public welfare. Quantitative measurement of this value has been attempted so far as present knowledge will permit.

DEPARTMENT OF ZOOLOGY

H. V. Wilson. Classification and Variation Studies on Sponges. A paper read before the Graduate Club, January 17, 1922.

After outlining our present classification of sponges and mentioning the value both of studies on the living sponge and of studies on the collection made by exploring parties, the speaker raised the question of what science is after in its work of classification. He pointed out that modern, western civilization has definitely come to the conclusion that a full inventory of the world, of its things and forces, must be made. Narrowing the view, it was shown that the classification of a group of organisms is desirable from several standpoints, which were discussed one after the other. Granting the desirabiliy for these several reasons of searching out and listing all the various kinds, species, of sponges, the question was then form-

ulated and discussed as to what is meant by the category, species, and is there a definite number.

The intimate connection between comparative morphology, of which systematics is only the digest, and the study of the origin of the variations to which new species primarily owe their existence was then shown. Finally attention was called to some striking species represented in the collection of Philippine sponges on the study of which the ideas presented by the speaker were in part based.

H. V. WILSON. A "Nature-experiment" on the Develpment of Frogs and One on the Physiology of Sponges. Read before the North Carolina Academy of Science, May 5, 1922 (in press *Journ. Eli. Mitch. Sci. Soc.*).

An abnormal type of frog embryo is described which at present it would be impossible to produce experimentally, and which contradicts the idea that concresence is a constant process in the embryogeny of a vertebrate body. Again a phloeodictyine sponge was described in which the growth of a calcareous alga had produced a mechanical condition which it would be impossible to duplicate experimentally and which yet made it possible to analyze with experimental certainty the functions of certain tubular outgrowths of the sponge.

Metschnikoff, Zoologist and Pathologist. Read before the Eli. Mitch. Sci. Soc., may 9, 1922 (*Proc. of the Society,* in press).

The influence of Metschnikoff's long continued studies on the behavior of amoeboid cells in the lower metazoa (sponges, coelenterates, echinoderms) was emphasized as leading to his discoveries, hygienically so important, concerning the resistance of the body to disease.

H. S. EVERETT. Notes on the Reproduction of Hydra in the Chapel Hill Region. Read before the North Carolina Academy of Science, May 6, 1922 (in press *Journ. Eli. Mitch. Sci. Soc.*).

Data are recorded relative to breeding times of hydras and to the effect of starvation on the development of the male gonads.

C. DALE BEERS. Bud Development in Simple Ascidians (thesis for the M.A. degree).

The observable facts in the bud development of *Ecteinascidia turbinata* are outlined. Some comparison is then made between the embryogenic methods of bud development and egg development in Ascidians.

The primordium of bud, conforming to the usual type found in Ascidians, consists of one vesicle lying within another, a blood sinus separating the two. The outer vesicle arises as an evagination from the outer or ectodermal tuble of the stolon, the inner vesicle as a similar evagination from the inner or endodermal stolonic tube. The primordia of the pericardium and heart, gonads, and nervous system (hypophysis and its two associated structures, ganglion and subneural gland) arise as proliferations from the wall of the inner vesicle. The peribranchial sacs are cut off from the inner vesicle by ventrolateral folds, a median portion or atrium being formed anteriorly, but only the two lateral sacs posteriorly. The inner vesicle persists as the branchial sac and develops the intestine as an outgrowth. The origin of the stigmata as evaginations from the peribranchial wall is striking, for they usually arise as evaginations from the branchial wall.

Of especial interest in budding is the origin of the nervous system and peribranchial sacs. In egg development these structures are of ectodermal origin, whereas in bud development they arise from the inner vesicle, a structure clearly endodermal. Such a develpomental method is noteworthy because of the contradiction which it offers to the germ layer theory as usually conceived: viz., that the two primary germ layers are physiologically specialized organs of the embryo and hence able to give rise only to particular structures. It is clear that in Ascidians no such specialization of layers has occurred, for here the endoderm has latent in it capacities for developing, not only the organs usually formed by endoderm, but others usually of ectodermal origin. The facts make the germ-layer theory, as generally interpreted, untenable for Ascidians.

RESEARCH ORGANIZATIONS

The programs of the research clubs at the University are appended:

ELISHA MITCHELL SCIENTIFIC SOCIETY

250TH MEETING—OCTOBER 11, 1922

Dr. Collier Cobb—*Physiographic Process in Relation to Harbor Development.*

Election of Members.

251ST MEETING—NOVEMBER 8, 1921

Dr. F. P. Venable—*Isotopes.*

Dr. W. C. Coker—*A Visit to Lapland and to Some Old Herbaria.*

252ND MEETING—DECEMBER 13, 1921

Dr. A. S. Wheeler—*Research in Progress in Organic Chemistry at the University.*

Prof. A. H. Patterson—*The Ether vs. What?*

253RD MEETING—JANUARY 10, 1922

Prof. G. M. Braune—*Experiments on Determination of Lateral Earth Pressure.*

Dr. Otto Stuhlman, Jr.—*The Wireless Telephone* (illustrated with motion pictures).

254TH MEETING—FEBRUARY 14, 1922

Prof. T. F. Hickerson—*Transition Spirals for Roads—A New Method.*

Dr. F. C. Vilbrandt—*The Manufacture of Beet Sugar.*

255TH MEETING—FEBRUARY 25, 1922

(Special Meeting in honor of Dr. J. E. Mills, Director of the Chemical Warfare Investigations at Edgewood Arsenal.)

Dr. J. E. Mills—*Chemical Warfare—Methods of Attack and Defense.*

256TH MEETING—MARCH 14, 1922

Dr. H. B. Anderson—*Spirocheticidal Action of Arsphenamin (Salvarsan, "606").*

Dr. J. F. Dashiell—*Measurement of Intelligence in Different Social Classes.*

257th Meeting—April 11, 1922

Dr. Archibald Henderson—*Generalized Relativity and the Three Tests.*
Dr. W. F. Prouty—*The Rejuvenated Ocoee.*

258th Meeting—May 9, 1922

Dr. H. V. Wilson—*Metschnikoff, Zoologist and Pathologist.*

Dr. Wm. DeB. MacNider—*The Influence of Alcohol on Kidney Function.*

Election of officers for the year 1922-1923.

THE PHILOLOGICAL CLUB

During the past academic year the club had forty members, from the faculty of the various language departments and from the Graduate School. Seven meetings were held, three of which were devoted to papers or lectures by visiting scholars: Dr. Tom Peete Cross, of the University of Chicago, Dr. E. K. Rand, of Harvard, and Dr. George P. Jackson, of Vanderbilt. The other four meetings were devoted to papers by members of the University faculty. The complete program was as follows:

November 1—Dr. Edwin Greenlaw, "An Elizabethan Humanist."

December 6—Dr. Tom Peete Cross, "Villemarque."

January 10—Dr. J. F. Royster, "The Present Direction of Philological Studies."

January 31—Dr. E. K. Rand, "Milton in Rustication."

March 6—Dr. T. S. Graves, "The Comedy of Stage Death," and Dr. Oliver Towles, "Recent Additions to the French Library."

April 4—Dr. W. M. Dey, "La Dernière Nuit de Don Juan," and Dr. G. A. Harrer, "Papyri in Greek and Latin Study."

May 2—Dr. George P. Jackson, "The Origin of Rhyme."

Abstracts of the papers by members of the University faculty appear elsewhere in this bulletin, under the writers' names. An expanded form of Dr. Rand's paper is published in the April, 1922, issue of *Studies in Philology*, Vol. XIX, No. 2.

Dr. Cross traced the history of Villemarque, a French scholar, who produced a great mass of writings which he published as rediscovered material from the folk-lore of Brittany. Villemarque's forgeries were attacked on all sides, but he never retracted any of them.

Dr. Jackson explained the close connection between the words and music of songs, and accounted for the origin of rhyme in the Middle Ages by a harmonic, melodic, and rhythmical analysis of Mediaeval songs.

THE NORTH CAROLINA CHAPTER OF THE SOCIETY OF THE SIGMA XI

Two lectures by F. W. Aston, M.A., D.Sc., F.R.S., of Trinity College, Cambridge, England, on Atomic Weights and Isotopes.

Dr. Aston gave a concise and comprehensive account of his investigations on the isotopes of the elements. He established a very fundamental and far-reaching theory, that the atoms have weights which are all integral numbers, and that observed fractional atomic weights are due to mixtures of two or more isotopes.

Starting from his original discovery of the complex nature of neon and chlorine he outlined his successful attempts to separate the components of these gases. He described his modification and subsequent perfection of Sir J. J. Thomson's method of positive-ray analysis, by which it is now possible to photograph as mass-spectrograms all the elements obtainable in a gaseous state.

The spectra were obtained on a photographic plate, placed in vacuo, by deflecting positive-rays on to it by passing them first through an electric, then through a magnetic field in such a way that all the rays corresponding to an element of given mass were concentrated in a short line on the plate and those of different masses in other parallel lines thus forming a spectrum similar to the bright line spectra met in optics.

The separation of the lines was sufficient to fix the atomic weights to considerably less than a tenth of a unit.

His illustrations, by means of lantern slides, were replicas of his original photographs of these mass-spectra. They were used to show how it had been possible to demonstrate that boron consists of two, neon, silicon and chlorine of two or three, bromine of two, krypton of six and mercury of at least two isotopes; that is, elements of the same chemical properties, but of different atomic weights represented by whole numbers.

Taking oxygen of atomic weight 16 as standard, hydrogen alone gave an atomic weight of 1.008, differing from an integral value, and this discrepancy could be explained by considering that the spectrum of hydrogen was due to a hydrogen atom from which an electron had

been withdrawn, which from theoretical considerations should have a mass differing by the observed amount from that of the hydrogen atom.

THE GRADUATE CLUB

The organization of the club was effected at the first meeting. W. D. MacMillan served as president for the first term; R. W. Adams, treasurer, and R. P. McClamroch, secretary. For the second term, the officers were H. G. Baity, president; P. E. Greene, treasurer, and C. D. Beers, secretary. The club departed from the procedure of the previous year, in which methods of comparative research had been presented and discussed; the general subject was the study, through committee reports, of some of the problems affecting both the instructors and students of graduate work. The committees selected concerned themselves with the following topics: Research Methods in Undergraduate Classes; the Master of Arts Degree; The Relation between Research and Teaching; Special Research Fields at the University; and Graduate School Extension.

First Meeting

At the first meeting, President Chase welcomed the club on behalf of the faculty and University. Dean Greenlaw then addressed the meeting, outlining the purposes of the Graduate Club. He also pointed out the practical value of research and research methods, as specifically applied to large industrial institutions.

Second Meeting

At this meeting, Professors Foerster and Dey reported upon the methods of graduate study and the requirements for degrees in the English and French universities. Relative to conditions at Oxford, Professor Foerster stressed the point that "the average American student is little prepared for graduate study" there, but that the Master of Arts degree should be taken previous to the pursuit of such study in the English universities. He likewise brought out the indefiniteness of the requirements for the degrees of Master of Arts and Doctor of Philosophy.

Professor Dey's talk was concerned with the conditions at the Sorbonne. He pointed out the stages of study and the requirements for the French doctorate, and further indicated the difference between the French and American graduate schools, by showing the inaccessibleness of the French professors even to graduate students. Before the meeting closed, Dean Greenlaw announced the composition of the various committees, whose reports constituted the work of the club for the remainder of the year.

THIRD MEETING

This meeting was turned over to Committee A, Professor Bell, chairman, for its report upon "Research Methods in Undergraduate Classes." A summary of the report follows:

The function of Committee A is to determine to what extent the "research method" is employed in undergraduate instruction, and by what means students of research ability and tastes are selected from the great mass of the student body.

A rather broad meaning is given to "research method." It may signify any direct reference to original sources, with the object of reproducing a situation, for example an historical event, either by dramatic interpretation or by strict adherence to the historical facts. It may signify direct reference to original source to support some thesis, whose truth has already been established. It may of course start a student in investigation in an unknown field, the results of the investigation being or not being possible of prediction. All these various phases of "research method" are employed in University teaching. A more detailed account is given in Prof. Hibbard's report.

What criteria are employed to select the man who should be encouraged to follow a research career? The established method is purely empirical—the guess and try method. Prof. Crane in his report agrees that to the present there is no other method, as because the qualities for a good researcher have not been sufficiently analyzed, and probably are of too complex character to tabulate.

FOURTH MEETING

Committee B, Professor Howe, chairman, reported at this meeting upon "The Master of Arts Degree." The committee's report was handled through two sub-committees, Professors Booker and Foerster being the respective chairmen. The report of the former was concerned with the requirements for the master's degrees in other institutions; the latter, upon the relation between the degrees of Master of Arts and Doctor of Philosophy.

FIFTH MEETING

At the first meeting of the second quarter, Dr. H. V. Wilson addressed the club. While the basis of Dr. Wilson's talk was related to his studies on sponges, he also discussed several phases of the problem of research. An abstract of the paper will be found elsewhere in this Bulletin.

SIXTH MEETING

This meeting was devoted to the presentation and discussion of a report by Committee C, Professor J. F. Royster, chairman, on the relation between research and teaching.

Seventh Meeting

Committee D, Professor R. D. W. Connor, chairman, presented a report on a survey of fields of research specially adapted to the needs and situation of this University. The report was presented in two sections, the first dealing with subjects in which work may be done of special interest to North Carolina; the second with subjects of more general interest.

Examples of the first field are found in the wealth of legend, ballad, tradition, and historical material. Much of this material is of unique value because it has been retained in true primitive condition due to the isolated manner of life still possible both in the mountains and on our coastal plain.

The report gave many other illustrations, such as the study of conservation of the state's resources, the study of social and economic conditions, the study of the problems presented by the double system of education in the South. There was also a survey of some of the work now being done in several typical departments.

Eighth Meeting

At the last meeting of the year Dean Greenlaw presented a paper on the beginnings of scientific research in England in the seventeenth century, with special reference to Sprat's *History of the Royal Society.*

SEMINAR IN VIRGIL

The special seminar for advanced students of literature was conducted by Professor E. K. Rand of Harvard University. Professor Rand's subject was *Virgil and His Influence on Later Literature.*

The first half of the course was devoted to a study of the development of Virgil's powers and ideas. Special emphasis was placed upon the poet's early training and upon his experiments as revealed in the collection of his early poems. Then followed a thorough analysis of the *Bucolics* and the *Georgics*, which were interpreted not as detached and unrelated items, but as integral parts in the development of the epic genius. A brief examination of the *Aeneid* concluded the introductory section of the discussion.

The second half of the course discussed Virgil's influence on later literatures. Three moments were singled out as best illustrating the nature of the influence—the forerunners of Dante in the middle ages, Dante, and Milton.

RESEARCH PUBLICATIONS

Contents of the research publications of the University during the period covered by this Bulletin are as follows:

JOURNAL OF THE ELISHA MITCHELL SCIENTIFIC SOCIETY, VOL. 37

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Proceedings of the Elisha Mitchell Scientific Society, February, 1921, to May, 1921 1
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Rollins, Hyder E.—A Contribution to the History of the English Commonwealth Drama.
Padelford, Frederick Morgan.—The Virtue of Temperance in the Faerie Queene.
Whigam, R. G. and Emerson, O. F.—Sonnet Structure in Sidney's "Astrophel and Stella."
Monaghan, James.—Falstaff and His Forebears.
Recent Literature.

VOLUME XVIII, 4—OCTOBER, 1921

Charles H. Grandgent.—Illumination.
Jefferson B. Fletcher.—The "Comedy of Dante."
Ernest H. Wilkins.—Dante's Scheme of Human Life.
John S. P. Tatlock.—The Source of the Legend and other Chauceriana.
J. Leslie Hotson.—The "Tale of Melibeus" and John of Gaunt.
W. F. Bryan.—The West Saxon and Kentish First Person Singular Present Indicative Ending—e.
Maximilian J. Rudwin.—Bibliografia di Demonologia Dantesca.

VOLUME XIX, 1—JANUARY, 1922

Duane Reed Stuart.—Biographical Criticism of Vergil Since the Renaissance.
George Howe.—The Revelation of Aeneas's Mission.
Clinton Walker Keyes.—The Structure of Heliodorus' "Aethiopia."
G. A. Harrer.—Precedent in Roman Law.
H. V. Canter.—"Fortuna" in Latin Poetry.
F. B. Kaye.—The Influence of Bernard Mandeville.

VOLUME XIX, 2—APRIL, 1922

E. K. Rand.—Milton in Rustication.
Denis Saurat.—Milton and the "Zohar."
Allan H. Gilbert.—Milton and Galileo.

Tucker Brooke.—Marlowe's Versification and Style.
Baldwin Maxwell.—"Wily Beguiled."
Frederick Ives Carpenter.—Desiderata in the Study of Spenser.
F. F. Covington, Jr.—Another View of Spenser's Linguistics.

THE NORTH CAROLINA LAW REVIEW

The North Carolina Law Review was established by the School of Law of the University of North Carolina in the spring of 1922. The first number appeared in June. It represents an attempt to publish critical discussions by law students, law teachers, practicing attorneys, and judges, of problems of law of interest to the North Carolina Bar. The bulk of the material deals with the significance of important current decisions of the Supreme Court of North Carolina, of the Federal courts sitting in this State, and of the Supreme Court of the United States. Particular attention is paid to North Carolina legislation and to the influence of social, economic and political conditions upon the development of law in this state. This is the first journal of its kind to be published in the Carolinas, and, with the exception of the *Virginia Law Review,* is the only one in the South. There are, however, twenty-three such periodicals published by American law schools, and it is understood that five new ones will appear in the fall. Some of these, notably law journals published at Harvard, Yale and Columbia, are national and even international in scope. The function of the state university law review, on the other hand, is mainly that of intensively tracing and contributing to the development of the law in the single jurisdiction in which the school is located. And it was with this objective that the *North Carolina Law Review* was established.

It is edited by M. T. Van Hecke, editor-in-charge, and L. P. McGehee, A. C. McIntosh, P. H. Winston, and R. H. Wettach, associate editors. The student editorial staff for the first issue consisted of C. G. Ashby, R. H. Frazier, W. A. Gardner, D. W. Isear, B. B. Liipfert, F. B. McCall, R. M. Moody, C. L. Nichols, N. Y. Pharr, Richmond Rucker, W. T. Shaw and Granbery Tucker.

The table of contents for the first issue was as follows:

ARTICLES

Statute Law and the Law School, by W. F. Dodd, of the Chicago Bar.

Changes in North Carolina Procedure, by A. C. McIntosh.

Trade Associations and the Sherman Act, by Homer Hoyt.

Shares of Stock Without Par Value, by J. H. Pou, of the Raleigh Bar.

EDITORIAL NOTES

The Review.

The School of Law.

The New Law Building, by L. P. McGehee.

Wife's Separate Action for Personal Injury to Husband, by L. P. McGehee.

Resale Price Maintenance, by C. T. Murchison.

Diminution of Judges' Salaries by Income Tax, by N. Y. Pharr.

Bank's Liability for Payment on Unauthorized Endorsement, by C. L. Nichols.

Cy Pres Doctrine in North Carolina, by Richmond Rucker.

Risk of Loss Where Seller Retains Security Title, by R. H. Wettach.

Revocation of Parole After Termination of Sentence, by J. F. Steiner and M. T. Van Hecke.

Part Performance and the Statute of Frauds in North Carolina, by P. H. Winston.

Legislative Power to Penalize Violation of Administrative Rule, by D. W. Isear.

COMMENTS

Delegation of Power to Abolish Office of County Treasurer, by B. B. Liipfert.

Agreements for Fictitious Auction Bids, by F. B. McCall.

Liability of Justice of Peace for Negligent Failure to Docket Appeal, by W. A. Gardner.

Estoppel by Deed—Effect of Registration, by W. T. Shaw.

New Limitations on the Poll Tax, by R. M. Moody.

Effect of Motive on Duty Owed Hotel Boarder's Guest, by Granbery Tucker.

Limitations on Transferability of Shares of Stock, by R. H. Frazier.

State Enforcement of Eighteenth Amendment, by C. G. Ashby.

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